Gas Journal

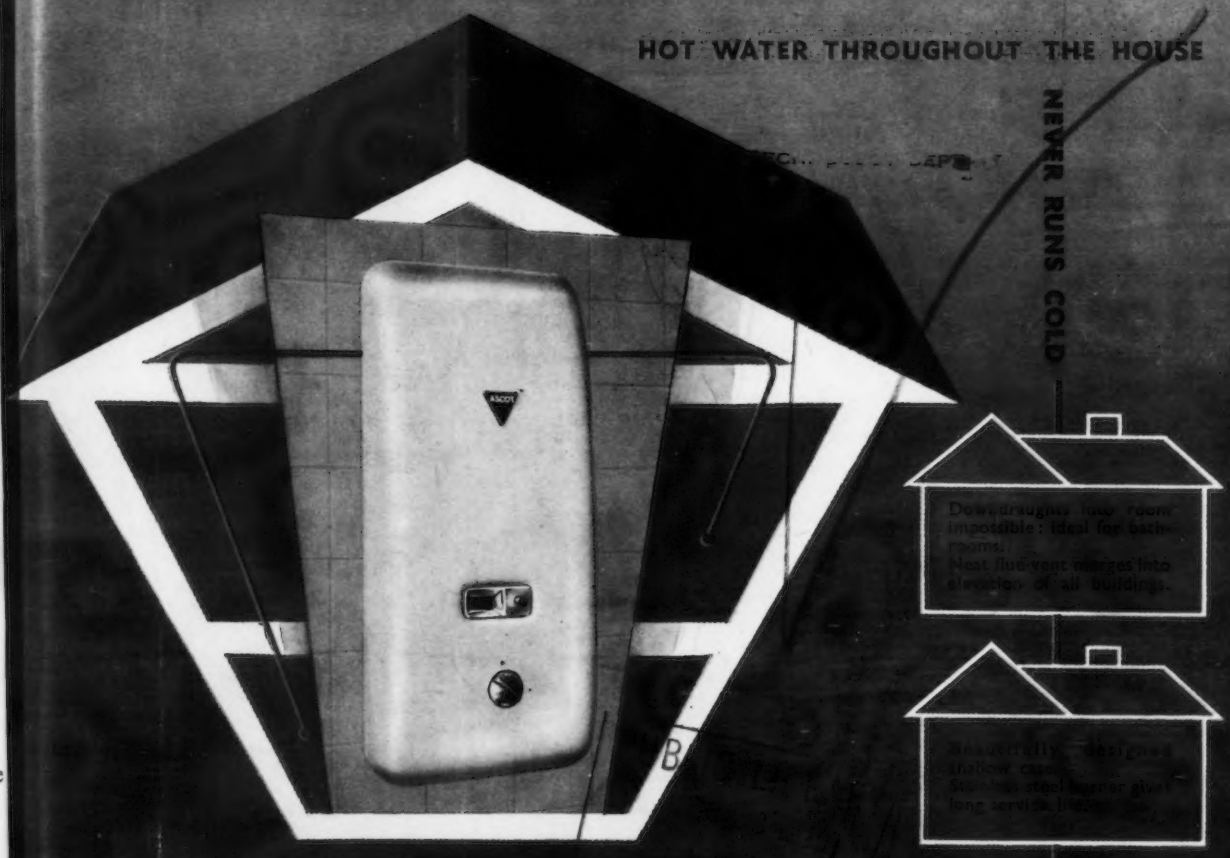
VOL. 284. 107th YEAR. LONDON, NOVEMBER 23, 1955 Nº 4825. PRICE 1/6

ASCOT 715

BALANCED FLUE

MULTIPOINT GAS WATER HEATER

HOT WATER THROUGHOUT THE HOUSE


NEVER RUNS COLD
Down-draughts into room impossible: ideal for bathrooms.
Neat flue-vent merges into elevation of all buildings.
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THE ASCOT 715 HAS BEEN SPECIFIED BY OVER 50 HOUSING AUTHORITIES

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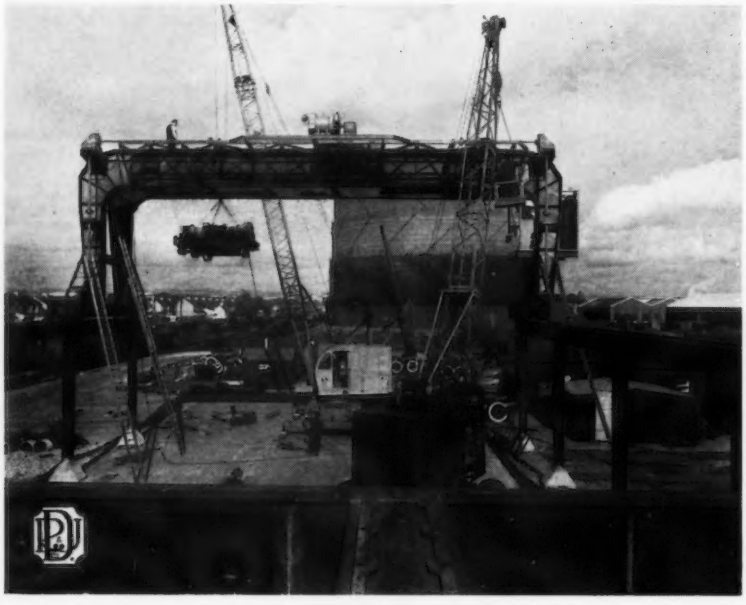
TRAY PURIFIERS

(Carr & Litler Patent No. 628338)

by DEMPSTERS of MANCHESTER

(The hallmark of high quality plant)

. . . . a constructive effort to EASE THE BURDEN, hydrogen sulphide below 0·1 grains per 100 cu. ft. and greatly reduced oxide handling costs.



A 7 million cu. ft. per day **DEMPSTER TRAY PURIFIER** installation in course of erection—The Crab of the Dempster Tray Purifier Crane being lifted into position.
(Photograph by courtesy of the Southern Gas Board.)

TRAY PURIFIERS can be economically designed for all capacities, and can be shown to save those oxide-handling costs which have long been accepted as inevitable in dry-box purification.
Operational simplicity of box-changing is another attractive feature of **TRAY PURIFIER INSTALLATIONS.**

The popularity of TRAY PURIFIERS by DEMPSTERS of MANCHESTER continues to increase, as is evidenced by the following figures relating to installations already operating or on order at the present time:—

1952——4 million cubic feet capacity
1953——26 million cubic feet capacity
1954——36½ million cubic feet capacity
1955——59½ million cubic feet capacity

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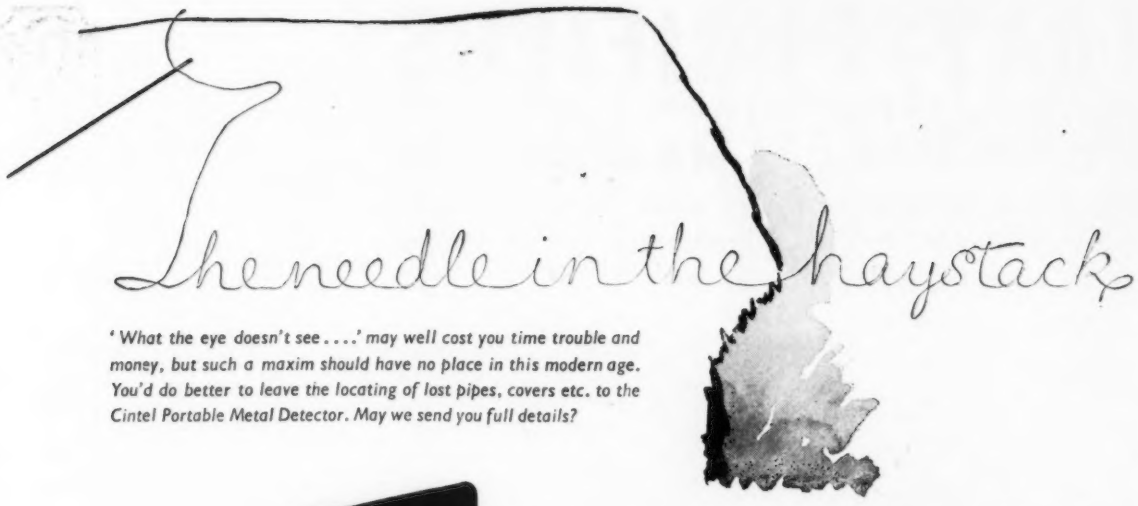

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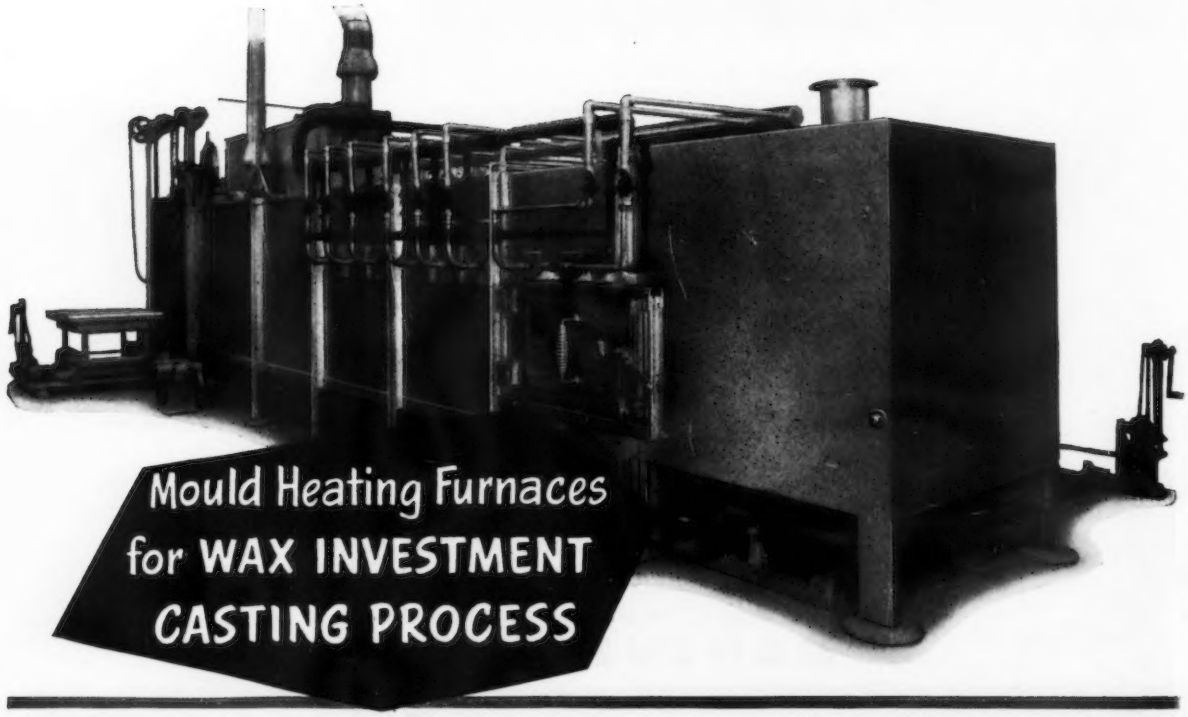

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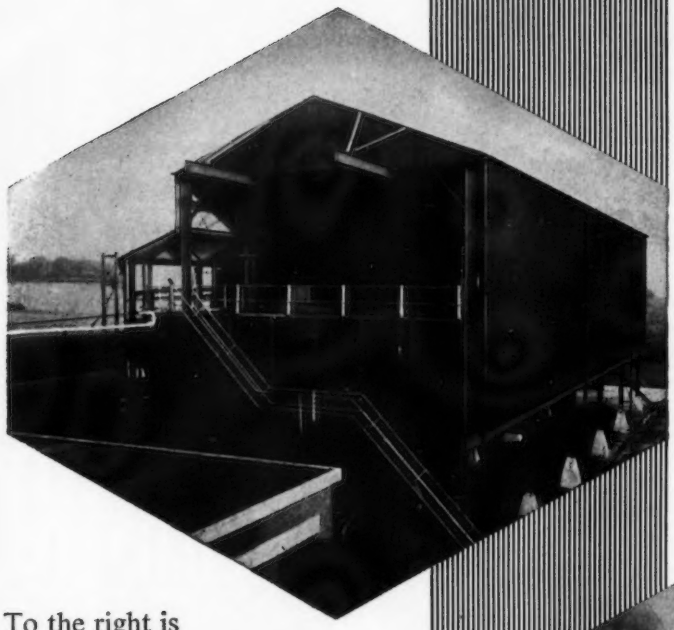
PURIFIERS FOR THE GAS INDUSTRY



The recently completed installation to the left consists of five welded steel purifier boxes, each 24 ft. by 30 ft. by 10 ft. deep, which were designed, fabricated and erected by Whessoe for the National Coal Board at Stella Gill (Chester-le-Street).

The capacity of this installation is 4 million cubic feet of gas per day.

To the right is illustrated a 6 million cubic feet per day installation designed, fabricated and erected by Whessoe for the North Western Gas Board works at Warrington. It consists of five welded steel boxes, each 45 ft. 9 in. by 35 ft. by 10 ft. deep.

These two installations are examples of the wide range of gas plant made by Whessoe for the gas and coke oven industries.

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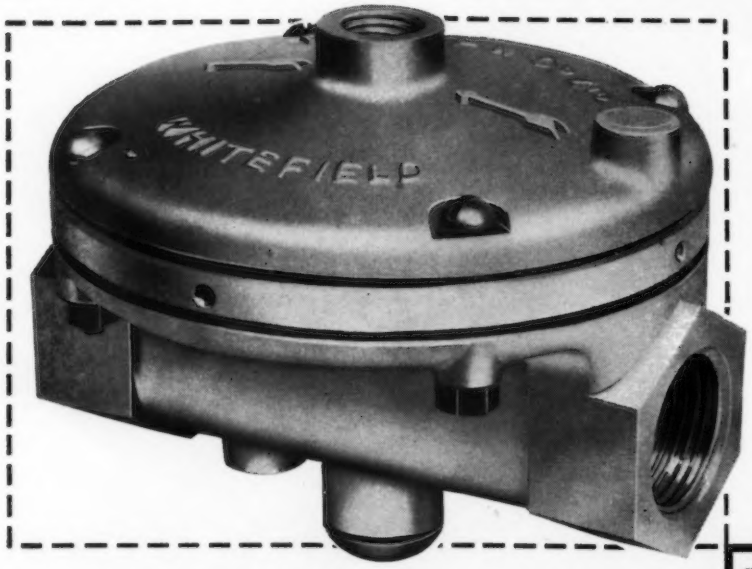
and at LONDON and NOTTINGHAM



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- ★ Extremely reliable and economical

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PRESSURESTAT

FOR USE ON STEAMING EQUIPMENT

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- ★ Adjustment for alternative pressures

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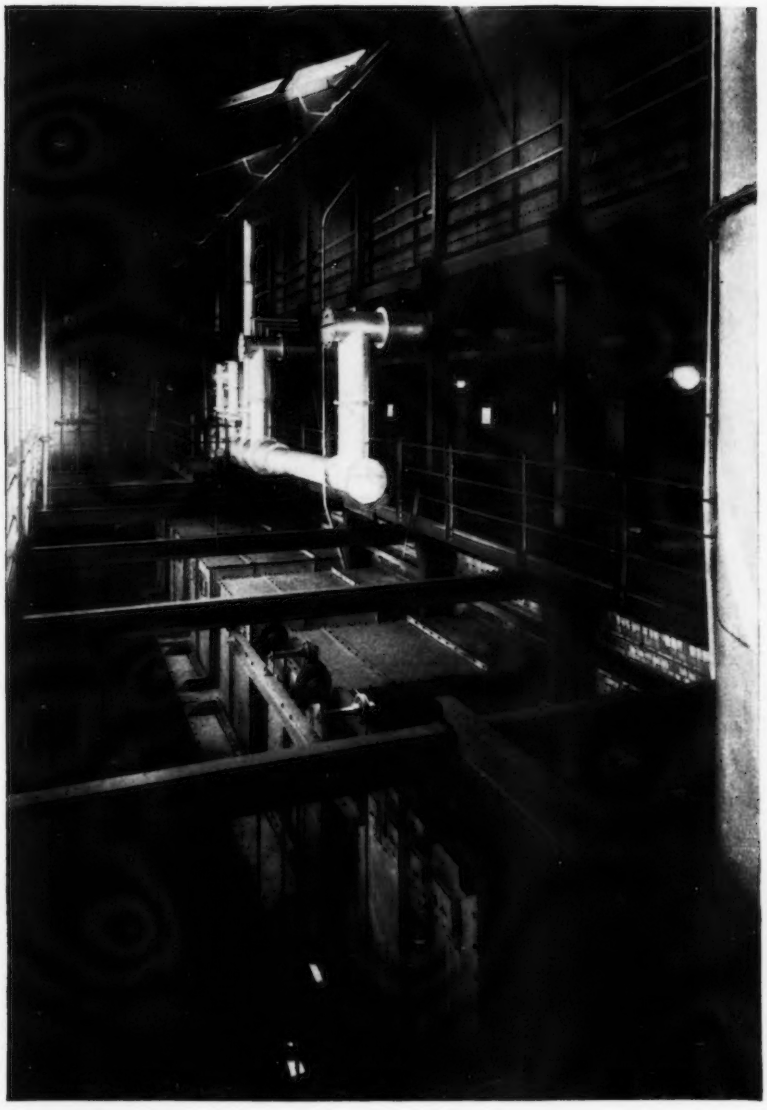
Unretouched photograph published by the courtesy of the North Western Gas Board.



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Bench showing Waste Gas Off-takes and Main Flue, and Isolation Dampers for Chimney and Waste Heat Boiler.

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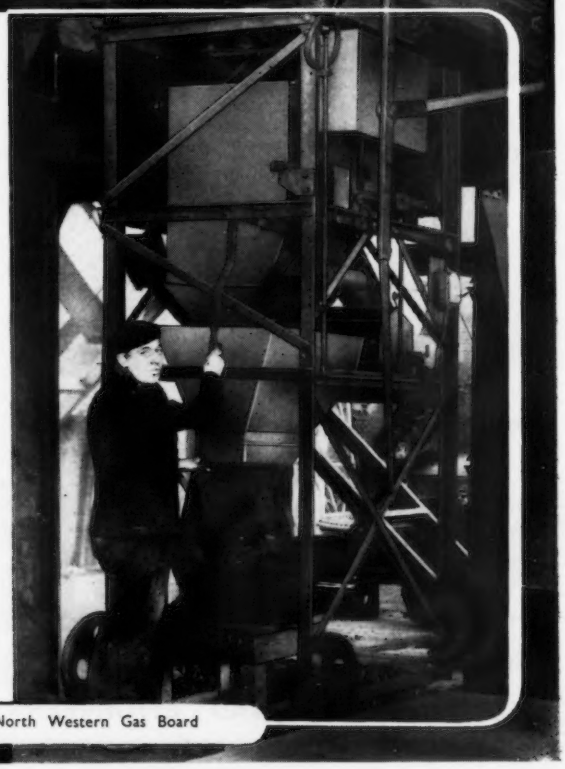

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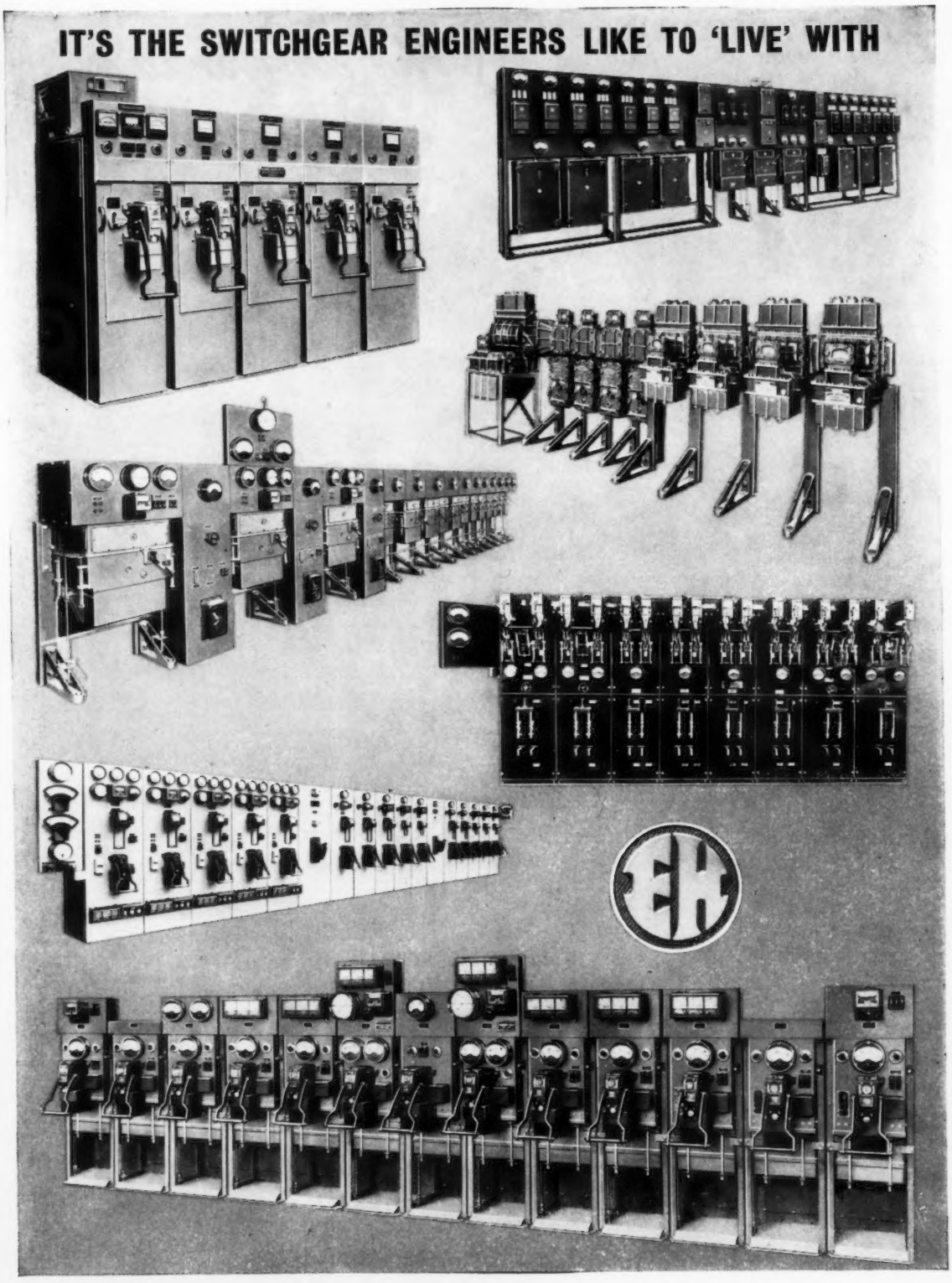

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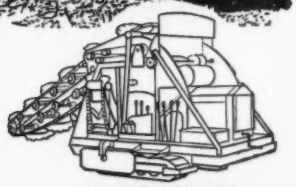

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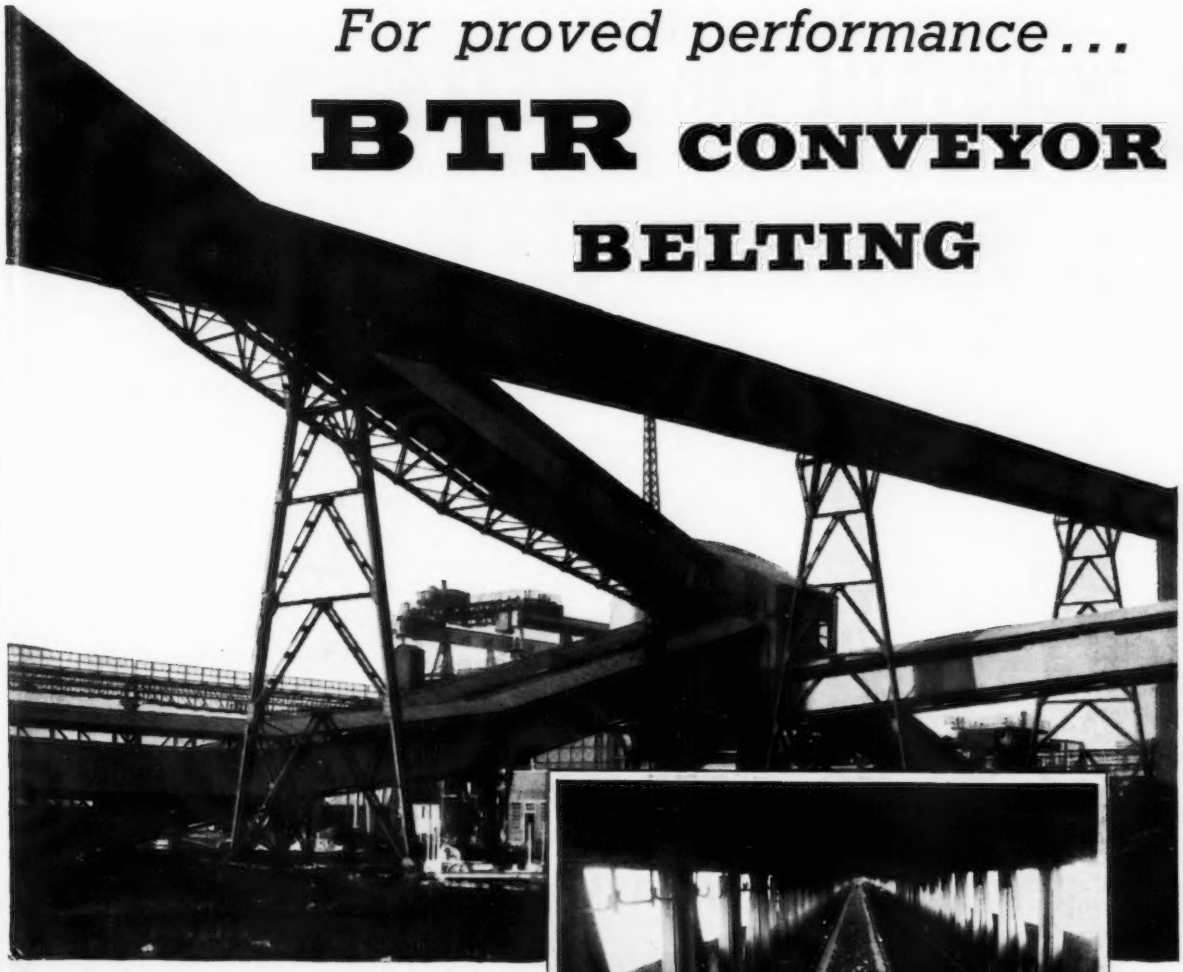

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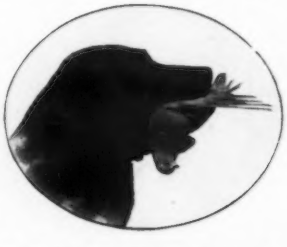

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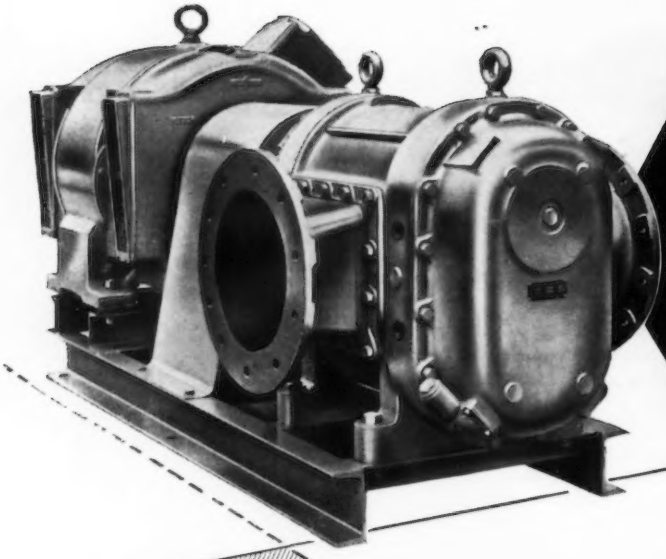

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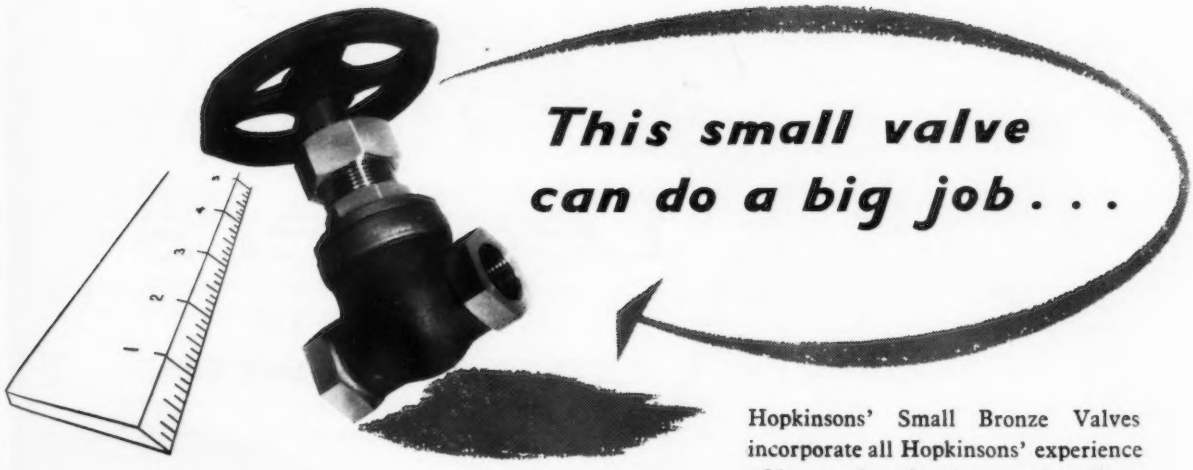

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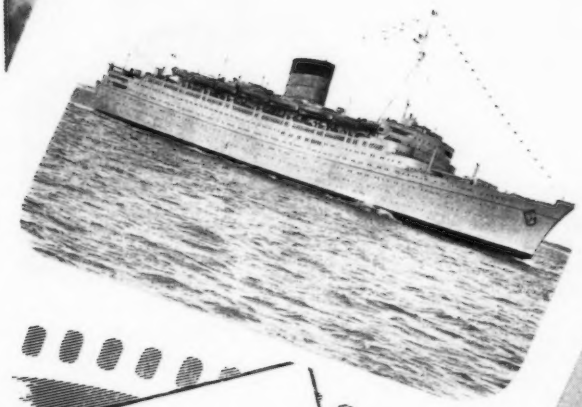

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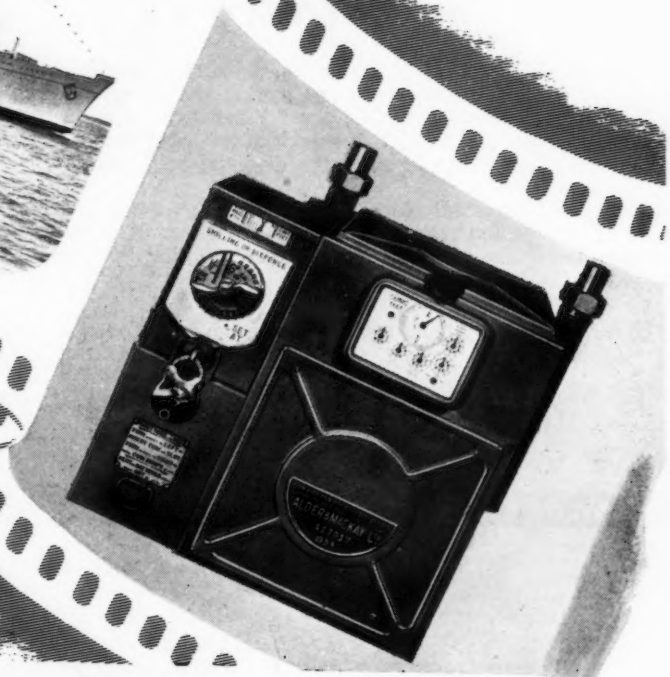
. . . Britain's and Cunard's biggest post-war liner (34,183 tons) in which the British Gas Delegation sailed to America this year, shares one particular feature with A. & M. meters.

Illustration with acknowledgement to The Cunard Steam-ship Co., Ltd.



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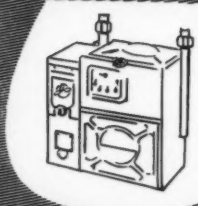

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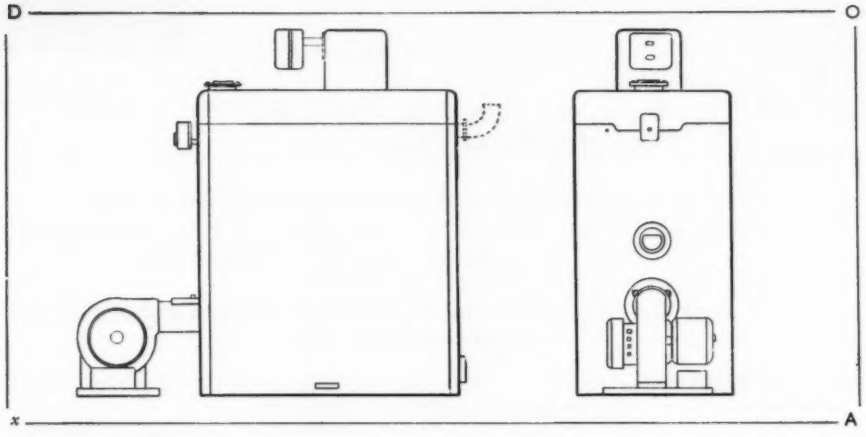
That if oil is the fuel to be used for the supply of hot water for central heating and domestic purposes it is most economical to employ a Potterton Oil-Fired Boiler.



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Construction: Designed specifically for oil firing.

Required to Prove: That, given oil as the fuel, there is no more economical means of supplying hot water for central heating and domestic use.

Proof: The cost of any heating service is the sum of:

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ii. the running costs.
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∴ If oil is the fuel to be used for the supply of hot water for central heating and domestic purposes it is most economical to employ a Potterton Oil-Fired Boiler.

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where *x* = number of sections and can have integral values of from 3 to 8.

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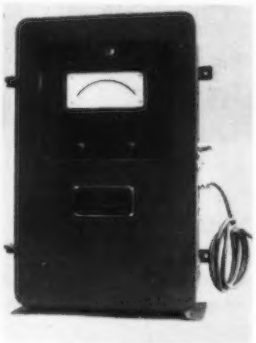

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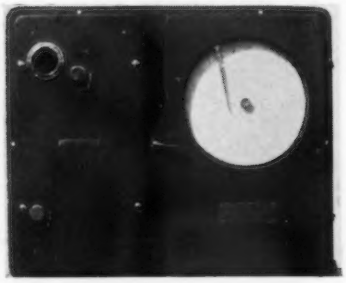

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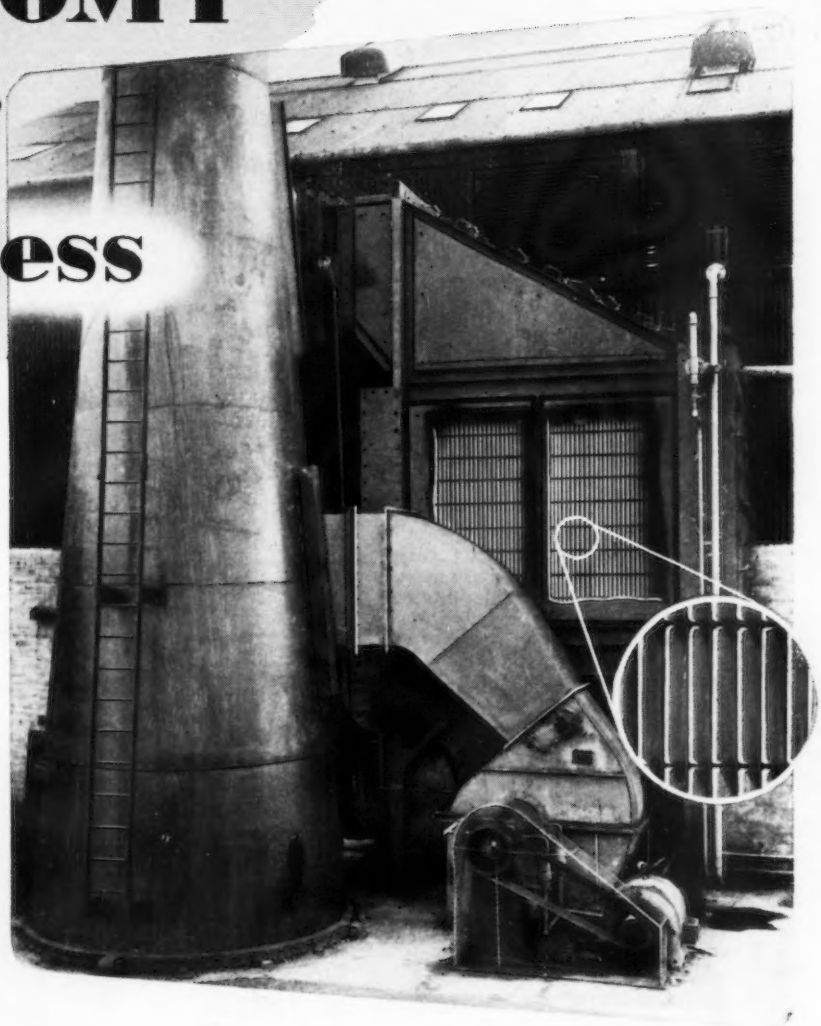

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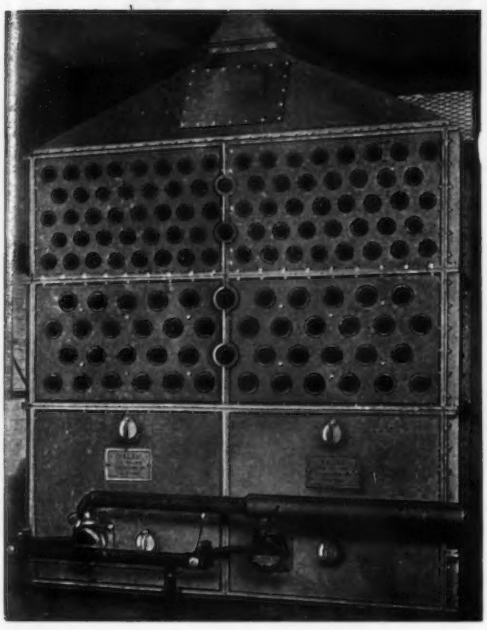

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VOL. 284 NO. 4825 November 23, 1955
107TH YEAR

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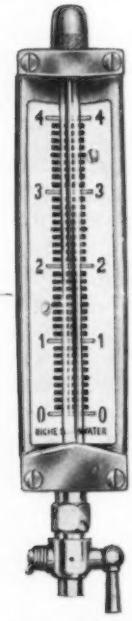

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Gas Journal

VOLUME 284. No. 4825. NOVEMBER 23, 1955. 107th YEAR

Research in the Gas Industry

THE life-blood of progress is research, especially in this day and age when new scientific processes and techniques follow one another at bewildering speed. Nowadays, any nation which wishes to remain a great power must see to it that adequate resources are earmarked for research into those subjects which touch upon its military and economic strength. In the same way any industry which intends to maintain its position in competitive markets must not fail to support research into possible new materials and processes and greater economy in the use of existing materials and techniques. We have commented before in these columns about the disparity between the amount of money allocated to research in this country as compared with that spent in the United States. Nevertheless, we in Britain can consider our efforts, though smaller, not insignificant having regard to the resources of the nation. It is certain that many of the most fundamental scientific discoveries have been made in this country, and none can doubt the skill and quality of our research workers.

The gas industry could not have maintained its eminent position in the service of the nation had it not appreciated the true importance of research. Until recently, however, the number of units comprising the industry was very great, while some units were large and some very small. To meet the common need of these diverse interests the Gas Research Board was established, and this provided a research service for all those who cared to contribute towards its support. Although this body no longer exists, it has sterling work to its credit—some of which work has since been incorporated in the industry's standard practice. Nationalisation of the gas industry and the many problems of the post-war period have placed a new emphasis on research as applied to gas manufacture, distribution and utilization, and these same circumstances have given it a wider scope and a greater urgency. The two research stations —one in London and one in Birmingham—now serve all the area boards and they have as complex a web of problems to deal with as ever faced the industry. As is usual with research establishments these two stations carry out their work quietly and without fuss, content that they are meeting and anticipating the industry's changing needs. Sometimes one wishes that more limelight could be shed on their activities and that the trumpet of their achievement might sound a little louder. However, research workers are by nature a cautious species and prefer to maintain reticence about their work and to make assurance doubly sure.

Extensions to the Gas Council's London Research Station at Fulham have been completed recently, and it was a happy thought that this should be made the occasion for an official opening ceremony and a tour of inspection of the laboratories, which are administered by the North Thames Gas Board for the Gas Council. On Friday last, November 18, Sir Robert Robinson, O.M., the celebrated scientist, inaugurated the three new laboratories, the addition of which just about doubles the floor space available to the Station. A distinguished company including the Chairman and Deputy Chairman of the Gas Council and no less than three Area Board Chairmen then toured the new building and afterwards the other laboratories (see page 537). One could not help noting, especially in conversation, that the research workers throughout the Station have an intense interest in their work, which covers all aspects of the production and purification of gas. Many projects are under investigation and it is to the credit of Dr. R. H. Griffith, the energetic Director of Research, that all seemed to be advancing vigorously and under a well co-ordinated control.

In the new building the manufacture of a catalyst for organic sulphur removal is proceeding as are also investigations into such varied subjects as the life of refractory materials and the biological oxidation of gasworks effluents. Work in hand in other laboratories covers many facets of gas manufacturing and purification processes—all having the common object of improving the industry's efficiency. There seems to be considerable emphasis on catalysts and their place in the chemical processes which occur in gasworks. It is interesting to record that the catalyst for the removal of organic sulphur was developed and the process for its manufacture perfected at Fulham. Already small plants have been supplied to industrial consumers who, by the nature of their products, need a sulphur-free gas. Following on the Harrow plant it is understood that a large-scale installation is under consideration for another works of the North Thames Gas Board. Might it be that the dream of the appliance manufacturer—completely sulphur free gas—is at last within reach? Other uses for catalysts in present day gasmaking lie in the field of oil gasification, and there may be many other applications. Certainly, Dr. Griffith thinks that they have an

important part to play in the future of the industry.

Among the most stubborn of the industry's problems is the disposal of gasworks effluents. Over the years much thought and time have been given to this subject, which becomes ever more pressing as river boards and other authorities strengthen their regulations. The London Research Station has the problem well in hand and part of the new building is devoted to a laboratory for its study. The conclusions reached so far indicate that biological oxidation followed, possibly, by treatment with activated carbon or ozone may provide a solution.

In the course of their investigations, particularly in regard to the testing of works plant, the staff of the Station have developed a number of new instruments, of which that for automatic gas sampling in intermittent processes is a good example. The third of the new laboratories provides a fully equipped base for Fulham's mobile team of researchers, which team travels about the North Thames Area and carries out on-the-spot tests on new or modified full-scale plants. Apart from the improvements in operating efficiency obtained, this work is extremely valuable in that it promotes the closest co-operation between research worker and plant operator. It is true that only one board has the direct benefit of this work but the lessons learned profit the entire industry.

The organization of the London Research Station is admirable and its programme of work seems quite comprehensive. It did appear at first that research into the manufacture and preparation of coke was rather overlooked, but it is understood that work on this subject, particularly as regards the production of coke from coals unsuitable for gasmaking has been proceeding for some while in large-scale plant. At the Institution of Gas Engineers Research Meeting yesterday a Symposium on Coke highlighted the present significance of the industry's second major product, one that should receive increasing attention in future research programmes. Effort spent in improving the reactivity of domestic coke will be effort well spent. Here, in fact, is a problem to which the London Research Station could most usefully devote its closest attention.

SAFETY AND THE REGULATIONS

WHEN Mr. M. E. Lee, M.A., of the South Eastern Gas Board, Metropolitan Division, presented a paper recently to the London and Southern Junior Gas Association, entitled 'The London Gas Regulations,' he said that he didn't expect much subsequent discussion as the subject was very much cut and dried. But, as it turned out, the most controversial points arose from the discussion. The paper did not deal in detail with the regulations as the majority of them were concerned with standard practices. Instead, it was explained why the regulations existed, how they were actually evolved, how they related to Codes of Practice, and how they indicated lines of development. By-laws brought into force in the autumn of 1938 govern, to some extent, both the content and form of the regulations. The purposes of the by-laws are: (1) to ensure the structural stability of buildings by the specification of standards of strength and section of structural materials; (2) to control subsequent operations which might tend to reduce the stability; (3) to ensure that users of the buildings have reasonable protection against the spread of fire and reasonable means of escape from the building in case of fire; (4) to ensure that users of the buildings have reasonable standards of comfort through proper ventilation and natural lighting. The regulations were drafted with these purposes very much in mind and the Codes of Practice sponsored by the gas industry only provided material for the regulations to a very limited extent. There are, indeed, on occasions, significant differences between the recommendations of a Code and the requirements of a Regulation on the same subject. Apart from a few miscellaneous provisions the regulations deal only with technical matters and these under seven headings—installation of service pipes, installation of meters, installation of installation pipes, installation of gas appliances, installation of water heaters, installation of space heating appliances, and protection of combustible material.

The most notable contribution to the discussion came from Mr. F. C. Smith, of Watson House, who said that probably the regulations would become a pattern for regulations throughout the country. The regulations were not retrospective but brought with them a moral obligation that transcended any legal obligation. The question that most concerned him was one that is much in the public mind—that of safety. He, himself, was a member of a committee appointed by the Medical Profession. It was the aim of this committee to reduce the menace associated with gas. It was from bodies creative of public opinion, he said, that the urge came for greater legal powers for the industry. Here he mentioned an article which appeared in the November edition of *Family Doctor,* entitled 'Gas —Friend or Foe,' by Dr. Keith Simpson. In this article Dr. Simpson describes the carbon monoxide content of domestic coal-gas (8% to 12%) as a 'killer in the home.' He tells us that even if leakages from dilapidated appliances are overcome and the gas has been burned 'completely,' there are fumes that require ventilation. Carbon monoxide still remains in these fumes and might accumulate in the larder (from the 'frig.'), the kitchen (from the stove), the living room or the bedroom (from the fire or the radiator), or the bathroom (from the geyser). All these things require vents or at least ventilation, and Dr. Simpson presents some most impressive statistics of fatalities during recent years due to lack of this very necessary ventilation. He shows how sharply the figure has risen until now it stands at about 800 deaths a year. In attempting to find an answer he quite rightly concludes that it would be impracticable for the industry to eradicate the 'killer,' but, on the other hand, he states that the public can be warned—'till you're blue in the face, but the vast majority won't take much notice.' So, he proposes that statutory by-laws must be enforced and that the gas industry should have greater legal powers. But Mr. Smith did not think they wanted greater legal powers, nor did the public want them imposed. Legal requirements, he warned, must be capable of enforcement, and he could conceive of few things to be more misunderstood than law and interference brought into the home, for the Englishman still regarded his home as his castle and liked to keep the law outside. Therefore education and help of the public mind towards safety was better than law. He said that regulations exist to satisfy the requirements of coroners, who are trying to do a public job of work, to promote public safety. Coroners are frequently asking: 'What can we do to help?' and looking for ideas to improve safety. Coroners, themselves, often put forward ideas and there were occasions when Mr. Smith had been asked to take back to his Board certain suggestions for improving the safety of appliances. There is a good deal of sense in what Mr. Smith has said. And he has had sufficient dealings with coroners' courts to know. There is absolutely no use in having any legal powers if they cannot be put into effect. A major point about the London Gas Regulations, however, is that they must be carried out by the Board officials and the fitters, *i.e.*, the very people who have the opportunity of knowing them, rather than

the domestic consumer who might have some excuse for not knowing them. But to obtain some reduction in the fatality rate due to coal gas poisoning and to relieve the gas industry from the bad name that it is being accorded in this respect, the domestic consumer must be educated, rather than enforced, to co-operate.

REFRACTORIES UNDER FIRE

THREE main features stood out in the paper presented by Mr. Oliver and Dr. Carr at the Autumn Meeting of the Midland Section held recently in the Palace Hotel, Buxton, a somewhat shortened version of which paper we published in last week's 'JOURNAL.' The authors stressed the constant collaboration between the manufacturers of refractory materials, the designers and constructors of carbonizing plant (and where could there be closer collaboration than that between the two companies involved in the development of the works which the Section inspected after the meeting?) and the gas engineers operating it. They sketched, all too briefly, the elaborate and stringent precautions taken at Friden to secure products of consistent composition and physical properties. And they summarized in a most useful way the several theories which have been put forward to account for the serious but illusive phenomenon of flaking. Founded in the 1890's by the late Mr. John West the Friden works was laid out to exploit the pockets of silica sand which he found in the Derbyshire limestones. These sands proved very suitable for the production of a siliceous refractory of very high quality, but recent developments and the move towards the 95% silica brick has rendered necessary the importation of quartzites (gannister?) from outside sources, as well as kyanite from India for the production of sillimanite goods, and diatomaceous earth from Ireland for the manufacture of 'Dome' insulating goods. The paper sets out the accepted data relating to refractories for the carbonizing industries and discusses the several tests by which their heat-resisting and other physical properties are controlled. The discussion of jointing cements will be read with interest but it cannot be said that any finality has been reached in this direction. The authors divide the retort into four 'zones,' the top zone covering some 5 ft., out of the usual 25 ft., where the retort is surrounded by the cooling products of combustion and where deterioration is mainly mechanical, the next 6 to 12 ft. where the retort stands in full combustion chamber temperatures, where scurf is forming on the inside surface and where most of the flaking takes place, 'zone 3' in the bottom two or three combustion chambers where temperatures are often at the maximum and where the refractories are not protected by scurf and where slagging often takes place, and finally the bottom zone where the charge is entirely coked and where abrasion is the chief cause of deterioration. Slagging and flaking are fully described and discussed. The important point brought out in this paper is the undoubted deleterious effect of some coal ashes in both these directions. There is no particular novelty in all this but the point of view, that of the manufacturer, is fresh and stimulating.

The discussion of the paper was lively and instructive. Mr. Allen rather startled the assembly by calling for a retort material 'that would enable them to forget all about these different coals in so far as retort life was concerned.' Later he assured us that he was purposely forcing us to reconsider the possibilities of heat-resisting iron and steels. Longing eyes have looked in that direction more than once but it is to be feared that the prospects are not very encouraging. Even in the gas turbine, where expense has not been spared, the alloys so far put forward would not stand up to the temperatures we require. Mr. Pickering dealt at some length with the problem of securing the necessary useful data on coal ashes. His suggested trial retort bench should be taken up. Mr. Bate's extremely practical intervention in the debate was entertaining as well as very much to the point. While emphasizing the importance of keeping a watchful eye on the ingress of air from the bottom of the retort it took us back to the question as to whether it is more economical to work a retort to its maximum capacity for a reasonable life or to prolong its existence over a longer period of relatively low efficiency. Mr. Hawthorn stressed the importance of careful sizing of bricks, and careful building. He too startled us by throwing doubts on the accepted theory that scurfing, unless very carefully controlled, can lead to flaking. He put the principal cause to the very steep gradient in some zones between inside and outside temperatures. Another point of considerable interest, though of no great prominence in the paper, was the effort which is being made at Friden, and no doubt in most other manufacturers' works, in the production of a siliceous brick of high bulk density and therefore low porosity. We, like Mr. Myhill, would like to know just what are the limits in this direction 'with reference to the durability, mechanical strength and thermal properties' of goods of this type.

STUDENT EXCHANGE

A review of The International Association for the Exchange of Students for Technical Experience by its advisory committee, which includes one English member, points out in the Association's annual report that during the years 1948-1955 more than 20,000 students were sent abroad. Many of these were potential future leaders in the professions of their choice and the advisory committee believed that in addition to the professional aspects of their work they had, with the help of international industry, laid a foundation with those young people for the promotion of international understanding and goodwill. The Association, which is in consultative relationship with UNESCO and the United Nations Economic and Social Council, reports that 5,153 students were exchanged in 1955—an increase of 866 over 1954. Great Britain sent abroad 644 students and received in exchange 728 students from overseas. Among the industrial organizations which received them are listed the Eastern, North Thames, North Western and South Eastern Gas Boards. In the majority of cases we know these boards found their presence invigorating, determined as they were to absorb all the information they could in a short space of time. There is no doubt that this scheme has already become of great value to the world's industrial future, quite apart from its broadening effect upon the students' outlook. In Great Britain there are now 31 universities and colleges affiliated to the central organization. The Association now covers 21 member countries and it is anticipated that South Africa will join in January, 1956. The American Society for Engineering Education has recently issued an official mandate to the Institute of International Education in New York to sponsor the administration of exchange on behalf of American industry and universities.

ONIA-GEGI IN NEW ZEALAND

The first plant in Australasia to use heavy oil for gasmaking is now being manufactured in this country for erection at Hastings, New Zealand. The plant, an Onia-Gegi catalytic oil gas plant, is now being constructed by Humphreys & Glasgow, Ltd., to the order of the Hastings Gas Co., who decided, after considering various alternatives, to close down their existing horizontal retorts and to supply the whole of the gas to the town of Hastings from heavy oil. The plant has a capacity of 300,000 cu. ft. per day and sufficient standby is provided to ensure continuous production at all times.

Personal Notes

MR. THOMAS LEONARD ORAM, of Swindon, Wilts., has retired at the age of sixty-six, after 50 years in the gas industry. The last 32 he has spent as a gas fitter in Swindon. A presentation of a wallet of notes has been made to Mr. Oram by Mr. G. A. J. Horrod, who spoke of his long and loyal service to the South Western Gas Board.

MR. C. H. G. MILLIS, D.S.O., O.B.E., M.C., has been appointed by the President of the Board of Trade to be a part-time member of the National Research Development Corporation. His appointment is for three years. Mr. Millis is a partner in Baring Bros. & Co. Ltd. Mr. Millis succeeds Sir Edward de Stein who recently resigned from the Corporation in view of his business commitments.

MR. F. RICHARD KING has retired from I.C.I., Ltd., after nearly 36 years in the purchasing field. Joining the British Dyestuffs Corporation Ltd. soon after the First World War, he went to London on the formation of I.C.I. as an original member of L. H. Swinbank's Central Purchasing Department, continuing to purchase coal tar products and dyestuffs intermediates in which he has spent practically all his long career.

MR. E. J. KIMMINS (at present an Assistant Director-General) of the National Coal Board, has been appointed by the Board as Deputy Director-General (Operations); and MR. F. MARSH (Chief Planning Engineer) to be Deputy Director-General (Physical Planning). This is part of their reorganization of production department at National Headquarters. At the request of the Board MR. J. H. PLUMPTRE (an Assistant Director-General) has accepted temporarily the appointment of Deputy Director-General (Economic Planning) before taking up another appointment in the Board's service.

MR. WILFRID DAWES retired from the Woodall-Duckham Construction Co., Ltd., on October 31, after 36 years' service on the engineering staff of the company, and was the recipient of gifts from the directors and staff. He has also completed 49 years in the service of the gas industry. He received his early training with the old Normanton and Castleford Gas Companies and on leaving the Royal Artillery in 1919 joined Woodall Duckham. Mr. Dawes was in charge of the construction of many plants throughout the country prior to being transferred to Head Office in 1936. During the past eight years he has had charge of the Safety Department of the Company.

His interest in industrial accident prevention gave him the opportunity of forming the London Building and Engineering Contractors' Accident Prevention Group three years ago. He was the first chairman and is now vice-president of the Group. Mr. Dawes resides at Guildford and hopes to go into private practice.

MR. ALFRED B. EDMUNDS, general foreman in the coke oven department at the Ebbw Vale plant of Richard Thomas and Baldwins, Ltd., and MR. ERNEST CLAY, shift foreman, each with a record of over 40 years' service in the coke oven industry, has retired. At a dinner in their honour, both were presented with chiming clocks, the presentations being made on behalf of their departmental colleagues by Mr. W. G. Shearer, coke ovens manager.

MR. D. N. MCCASKILL, Works and District Manager, East Dereham (Norfolk), Eastern Gas Board, has been appointed by the Ministry of Fuel and Power to be Gas Examiner to the Brighton area of gas supply. On November 8, Mr. McCaskill was presented with a pen set by the Dereham District staff and members of the Norwich works consultative committee as a farewell gift before leaving for his new appointment. Articled with the Tonbridge, Kent, Gas Company, he has completed over thirty years' service in the gas industry, having held posts with the South Suburban, Bath, and Grantham Gas Companies. He has held his present position at East Dereham for nearly fourteen years. Recently a new high pressure mains scheme to integrate two neighbouring districts, Swaffham and Watton, had been operated successfully.

Obituary

MR. T. ORR has died in Motherwell at the age of 78. He gave 56 years' service to Motherwell gasworks, and tribute to him was paid by colleagues when he retired in January, 1947. He lectured frequently on the development of gas in the town.

MR. FRANCIS W. RICHMOND, the elder son of Mr. E. W. T. Richmond, the founder of the Richmond Gas Stove Co., Ltd., died on November 10. He entered into indentures as an apprentice with the Company in 1907, training in all the departments of the works and also gaining experience as a salesman. He served with distinction in the 1914-18 War and reached the rank of Major. On demobilisation in 1919, he became the Chief Sales Representative in the Midlands, transferring to London in 1922, having previously been elected to the Board of the Company in 1920. He became Sales Director for the Company and held that position until his retirement in 1933.

MR. JOSEPH POULSON, Engineer and Manager of the Stafford District, North Staffs. Division, West Midlands Gas Board, died on November 11. Mr. Poulson, who was sixty years of age, entered the gas industry in March, 1911, and from 1917 to 1921 was Technical Assistant at Stafford, when he was appointed Assistant Engineer and Manager. Mr. Poulson left in 1924 to take up the position of Engineer and General Manager to the Oldbury Corporation Gas Department, and was appointed to his position of Engineer and Manager at Stafford in April, 1942. The Poulson family have been associated with Stafford Gas Undertaking for many years, as Mr. Poulson's father and brother before him had been Gas Engineers at Stafford gasworks.

Diary

November 25.—SOUTH EASTERN G.C.C.: Kent Suburban Committee. Bell Green, Lower Sydenham. 2.30 p.m.

November 28.—SOUTH EASTERN G.C.C.: Sussex Committee, Brighton. 2.30 p.m.

November 29.—LONDON AND SOUTHERN I.G.E.: 'Ammonia Liquor as an Agricultural Fertilizer,' H. M. Lawrence.

November 29.—MIDLAND JUNIORS: Paper 'Manufacture of Pottery,' F. W. Kerry.

December 2.—LONDON AND SOUTHERN JUNIORS: Annual Reception and Dance. Caxton Hall, London, S.W.1.

December 7. — INSTITUTE OF FUEL, LONDON: 'Power, Population and Productivity' (1955 Melchett Lecture), Dr. A. Parker, C.B.E., Institution of Civil Engineers, Great George Street, S.W.1. 5 p.m.

December 7. — INSTITUTE OF FUEL: 'Two-Stage Gas Producer,' P. Clarke, Royal Victoria Hotel, Sheffield. 2.30 p.m.

December 7.—INSTITUTION OF CHEMICAL ENGINEERS: 'Phenolic Effluent Disposal,' D. A. Hall. The University, Leeds. 7 p.m.

December 8. — CHEMICAL SOCIETY: 'Some Aspects of Research in Scottish Division of the National Coal Board,' Dr. E. A. C. Chamberlain. North British Hotel, Edinburgh. 7.30 p.m.

December 9.—LONDON AND SOUTHERN JUNIORS: 'Materials Handling in Gasworks,' F. R. Warple, 178-180, Edgware Road, London, W.2. 6.30 p.m.

December 9.—MANCHESTER AND DISTRICT SECTION, I.G.E.: Joint meeting with Institute of Fuel. Short papers: 'Coke Manufacturing Problems,' Dr. G. E. Foxwell; 'Coke Utilization,' E. H. Coley; and 'Smoke Problem,' Dr. A. Semple. The Engineers' Club, Albert Square, Manchester. 2.30 p.m.

December 10. — YORKSHIRE JUNIORS: 'Industrial Gas,' F. Dickinson, Sheffield.

Coke Ovens as Gas-manufacturing Plant*

By G. Dougill, M.Sc., M.Inst.Gas E., F.R.I.C.† and A. C. Nelson, M.Inst.Gas E.§

WHEN The Gas Light and Coke Company decided, in the late 1920s, to install two batteries of coke ovens at Beckton to form a base-load plant, primarily for the manufacture of town gas from Durham gas coals, the decision called for a considerable amount of courage. Surplus coke-oven gas had, of course, been taken for purification and distribution by gas undertakings for many years wherever such gas was available, and one of the authors had experience of receiving coke-oven gas from the Middleton Colliery Company into the Meadow Lane works of Leeds Corporation as far back as 1915.

In addition to this, the Birmingham Corporation Gas Department had installed a battery of 66 coke ovens at their Saltley works in 1912. These were of Koppers design and incorporated a Buchanan stamping machine to compress the coal, which was then pushed into the oven as a solid cake. Top charging holes were fitted, but not used. The chief attraction of this plant, which operated on Midlands coals, was that at that time the coke commanded a considerably higher price than that from horizontal retorts. The by-product plant followed coke-oven practice and included direct ammonia recovery. Gasmaking results were satisfactory, but difficulty in disposing of the coke led to the plant being demolished in 1928, *i.e.*, after a relatively short life. It is obvious, therefore, that the proposal to install coke ovens at Beckton did not, at first sight, appear very favourable in 1930.

At this time, it would be fair to say, the coke-oven industry was emerging from a difficult period after the First World War. Many of the plants were old and badly in need of modernization and rebuilding. A very clear report of the conditions at this period was given in a paper by E. G. Stewart, the Assistant Chief Engineer of The Gas Light and Coke Company. He showed the steady change from beehive ovens to by-product ovens between the years 1900 and 1928, and then discussed the general position of the use of coke ovens as gasworks plant. He showed very clearly that coke ovens are only suitable for relatively large works, and estimated that the size of the minimum economic unit is 1,200 tons per day.

In 1930 there was, however, little really authentic information on four aspects that were of major importance to the Company; these were:

(1) The behaviour of Durham gas coals in coke ovens.

(2) The thermal yield per ton of coal from this type of carbonization.

(3) The flexibility of the plant.

(4) The life of the plant between resetting periods and its day-to-day reliability.

The present paper deals with these points in turn.

Behaviour of Durham Gas Coals in Coke Ovens

Considerable trouble had been experienced with the use of highly swelling coals on the walls of ovens, particularly in America. In some cases, charging-lids had been lifted and the oven doors burst off, in addition, of course, to damage to the silica walls. The Koppers Company of America were so seriously perturbed by this type of difficulty that they developed a test oven with a movable wall, in which experiments could be carried out with any unknown coal and advance warning of dangerous coals discovered.

At Beckton, the coal that was freely available by sea transit was the normal group of Durham gas coals (mainly type 501), which have a high swelling index, and in view of the need for a high yield of gaseous therms it was decided that every effort must be made to design a plant capable of using this coal. Experience of carbonization of Durham coals in England indicated that the gas coals from this area could be used satisfactorily in coke ovens, but, in view of their American experience, the Koppers Company of England were by no means convinced of this.

All investigators, however, had found that the degree of packing, or, rather, the bulk density of the coal as charged, had a considerable effect upon the pressure developed during carbonization. Dr. Koppers demonstrated that the bulk density of a charge was not uniform, but could vary very substantially in different levels and parts of the oven.

Powell and Russell showed that moisture in the coal charge also had an important influence on its bulk density, and stated that a reduction occurred in bulk density from 51 lb. per cu. ft. with zero moisture to 41.4 lb. per cu.ft. with 6.5% of moisture. Tests of the pressure developed through carbonization in the movable-wall oven showed a decrease from 4.3 lb. per sq. in. with zero moisture to 1.1 lb. per sq. in. with 2% moisture and 0.2 lb. per sq. in. with 5% moisture. The problem of using Durham gas coal, therefore, appeared soluble provided that the bulk density of the coal was kept low.

One solution of the problem, the use of a nut coal, was not acceptable since the quantities required would be expensive even if available. Grinding coal by high-speed hammer mills has, however, a very favourable influence in the desired

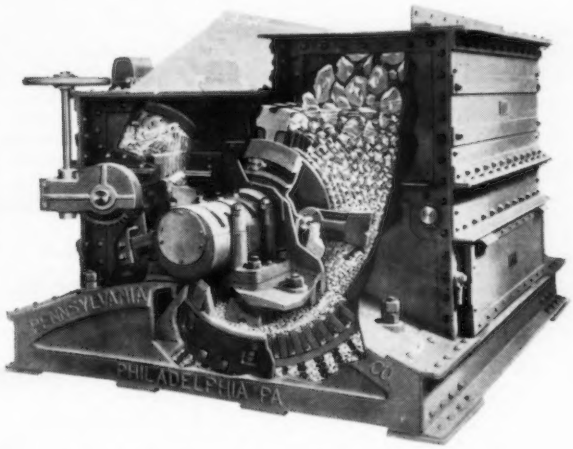

Fig. 1. Hammer mill showing crushing action.

direction since the blow given by the revolving hammer depends on the inertia of the particle being struck, and hence this type of mill tends to reduce the size of the larger particles without producing an undue proportion of fines.

The Thermal Yield of Gas per ton of Coal

Dealing with the thermal yield of gas per ton of coal, little exact information was available at this date. Gas volumes at most of the existing coke oven plants were usually measured by orifice, and rich gas heating was almost universal. The calorific value of the gas was rarely recorded continuously. The information that was available led to the belief that the thermal yield would be less from coal carbonized in ovens than from coal treated in our small retorts. Every step possible was therefore taken to further the production of a high thermal yield.

The Koppers recirculating oven was thought to be advantageous. As is well known, this design incorporates an opening at the base of the hairpin heating flue so that products of combustion recirculate back to the combustion space and so yield a larger volume of heating gases at a lower maximum temperature. (Fig. 2) The flame is lengthened and more even

* From a paper presented to a Joint Meeting of the Institution of Gas Engineers and the Coke Oven Managers Association on November 9. (I.G.E.: Pub. No. 471)

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§ Senior Assistant Engineer, Beckton Works, North Thames Gas Board.

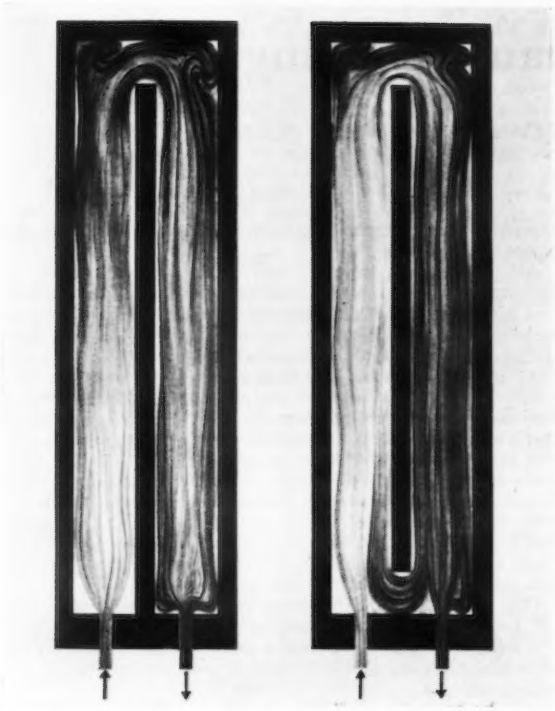


Fig. 2. Illustrating the action of the Koppers recirculating oven circulation port and its effect upon flame development.

heating is obtained over the height of the oven. In addition, the increased velocity of the heating gases favours the transfer of heat to the oven wall. The level of the top of the hairpin heating flues was carried to the same level as the top surface of the coal charge so that the whole area of the coal face was directly heated to a very even temperature without, it was hoped, unduly heating the space above the charge.

Gas offtakes were arranged at each end of the oven to minimize any differences in gas pressure and to prevent over- or under-deviations from the optimum oven pressure. The offtakes led into assembly mains at each side of the battery, and these mains were joined by an arch main in the centre of the battery. From the centre of this arch main, the gas was led to the condensers. It was hoped that these added refinements to the normal oven used for the production of coke would enable the maximum yield of gaseous therms to be obtained.

Flexibility of Output

Flexibility of output of gas to meet winter demands is, of course, a desirable characteristic even of base-load plant. Seasonal variation in demand for gas from our normal carbonizing plant is partly met by the usual method of arranging for all resetting work, repairs, and rebuilding to be carried out on a schedule during the times of lower demand. Seasonal and peak-load plant meets the remaining variation. In the case of coke ovens it is, of course, not possible to allow the plant to go cold during the summer, as can be done, within limits, with retort plants.

To meet this requirement, the proposed coke-oven plant was designed to operate on a carbonizing time capable of variation between 19 and 28 hr. In addition, heating was alternatively by producer gas made from small coke plus a proportion of breeze, or by rich gas. By these means, the output of gas could be varied within wide limits.

Producer Plant

The producer plant was arranged to consist of nine mechanical producers of which seven were normally in action, leaving two available for repairs or stand-by plant. The producers were provided with annular boilers of 8 ft. 6 in. inside dia., and fuel was supplied by a coke skip on a runway above the producers, so that fuels could be drawn from different hoppers. Each producer was to be supplied with its own scrubber cooler, and the gas leaving them then passed through a blower to the battery. A small gasholder was supplied to take the surplus gas during the operation of the reversing machine on the coke oven battery itself.

Life Between Resets

In order to obtain the maximum life between resets, the plant was solidly built, and special low-porosity silica blocks were used for the oven walls. Every care was used in bringing the batteries to working temperature and all possible attention was given to ensure the maximum life.

At this time, the carbonization of coal in the horizontal retort houses at Beckton was carried out at high efficiency, and from Durham run-of-mine coal approximately 75 therms of straight coal gas per ton were obtained without steaming and at a calorific value of about 540 B.Th.U. per cu.ft. The Koppers Company would only guarantee a thermal yield of 71 therms per ton under similar conditions, and this was easily obtained in the guarantee test. In fact, when the plant was settled down the thermal yield per ton was gradually worked up until it was little below that achieved in the retort houses. This is shown clearly in Table I, which gives the average results for the six-year period 1932 to 1938. The depreciation due to coal is also demonstrated in the results for the war and post-war periods. It can therefore be said with confidence that the plant was a complete success; not only were all our technical results achieved in generous measure, but the plant reliability was good and the amenities were very satisfactory. The only remaining unknown factor was the life of the ovens themselves, and time alone could give the answer.

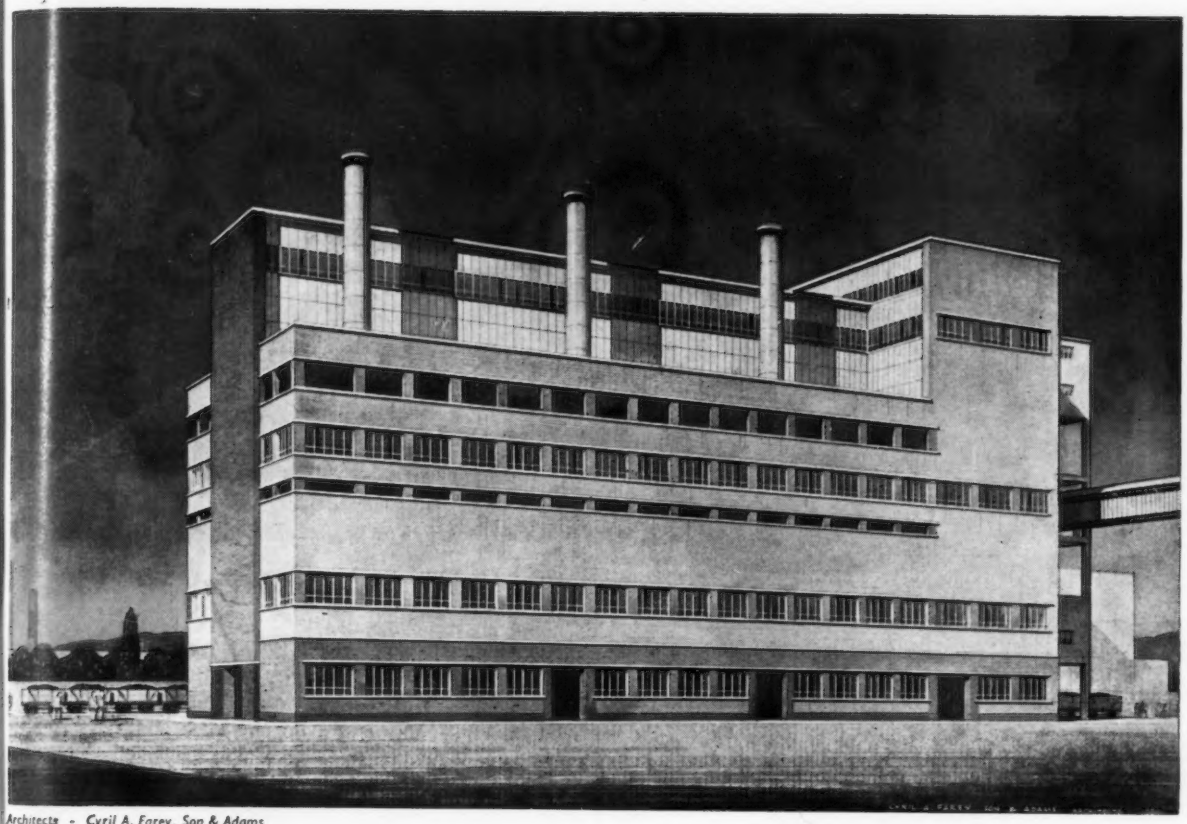
However well a plant is built, inevitably problems arise from time to time during the course of its operation, and it is these problems and their cure that are of the greatest interest, and from which most new knowledge is gained. It is felt that it would be of interest to list very briefly a few of the problems of general interest and describe how they were dealt with.

TABLE I.—YEARLY AVERAGES

Period	Plant	Coal carbonized			Gas made			Therms made		
		Total (tons)	Per day (tons)	Per oven per day (tons)	Total (mill. cu. ft.)	Per oven per day (cu. ft.)	Per ton of coal (cu. ft.)	Total	Per oven per day	Per ton of coal
1	2	3	4	5	6	7	8	9	10	11
1932 to 1938	Two batteries of 30 ovens ..	373,482	1,023	17.05	4,877,380	220,259	13,060	27,909,640	1,274	74.77
1939 to 1945	Two batteries of 30 ovens ..	365,672	1,018	16.69	4,567,341	208,963	12,525	26,405,190	1,205	72.21
1954 to 1955	Four batteries of 30 ovens ..	808,850	2,216	18.25	9,778,000	223,240	12,100	56,038,416	1,280	69.34

Carbon Sponge

The use of gas coal for coke ovens resulted in production of a considerable amount of carbon sponge in the coke. (Fig. 3.) A cross-section of an oven before pushing showed that, from the centre-line of cleavage of the coke charge, tarry matter had boiled and carbonized, producing a large blob of carbon sponge. Rather surprisingly, this carbon sponge was found to be very unreactive and, in addition, it broke down into breeze at all stages of transit and storage. An almost complete cure was achieved by blending 20% of Durham coking coal containing 28% of volatile matter into the Durham gas



Architects - Cyril A. Farey, Son & Adams

The new installation of

Continuous Vertical Retorts to be built

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Cowley New Works, Oxford

WOODALL-DUCKHAM

CONSTRUCTION COMPANY LTD.

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Something to crow about...

Pardon the excitement, but we can't keep quiet about the new Begwaco "Bantam" any longer. It has the accuracy, capacity and dependability of a large gas meter. "So what?" you may ask. Yet it is much smaller, beautifully compact and weighs only 8½ lbs! What's more, you'll find its clean, modern lines a great advance on anything you've seen before. It's a design to fit in happily anywhere.

DIMENSIONS

Height (to top of Union Bolt) - - 11 ins.
Width (over Unions) - - - - 9¼ ins.
Depth Back to Front (Flanges) - 6½ ins.

- *High Accuracy*—the 'Bantam' has the usual high accuracy of registration of all Begwaco meters.
- *Rapid Inspection. Simple Maintenance*—the casing is fitted with a pressure point to save time and simplify the work of the gas inspector. Meter easily taken down without special tools.
- *Easy to Fit*—Unions are to IGE standards, centre to centre, so that the 'Bantam' can be fitted to existing installations.

NEW

BEGWACO

BANTAM

150 CU. FT. GAS METER

BEGWACO METERS LIMITED
QUEEN STREET · FARNWORTH · LANCS.

coal, which contained about 32% of volatile matter; a slight reduction in gas yield was noted.

Naphthalene Removal from the Gas

At an early date, difficulties were experienced in the method of removing naphthalene from the gas. The primary condensers had been designed to cool the gas down to 100° F. and were reversible so that any naphthalene deposited on the tubes could be removed by reversal. In this way, the naphthalene deposits on the tubes were removed with the tar. These primary condensers were followed by the exhausters and from these the gas passed to two scrubber coolers in which the gas was cooled by a continuous circulation of liquor. The effluent liquor was bubbled through tar in the base of the towers and this tar was supposed to dissolve the naphthalene sludge that had come down with the liquor, and also to remove this sludge before the liquor passed to the liquor coolers and pumps.

Two troubles occurred: First, the naphthalene sludge in the ammoniacal liquor, being wetted by liquor, would not dissolve in the tar, and, secondly, the outlet gas mains rapidly blocked with solid naphthalene. Examination of the plant and its condition showed that the scrubber coolers did condense very considerable amounts of naphthalene from the gas. A proportion of this was carried down with the liquor, but a small proportion was carried away as minute flakes suspended in the gas. These flakes deposited at any suitable change of direction in the gas main.

Once the cause of the trouble was identified, a very successful remedy was applied that worked for many years. The use of tar in the base of the scrubber was abandoned and,

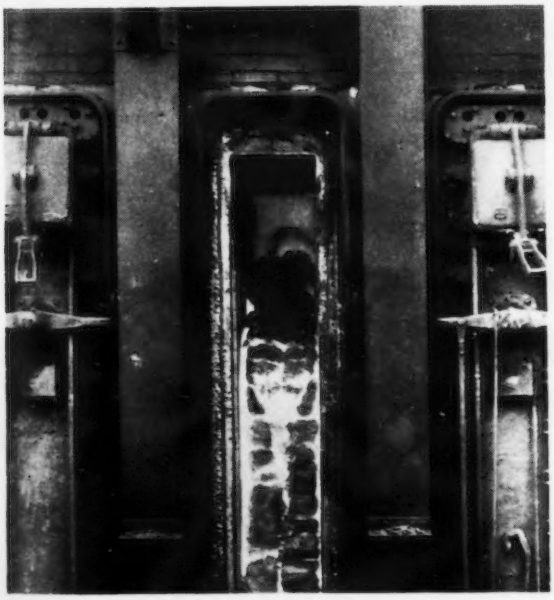

Fig. 3. Carbon sponge resulting from the carbonization of gas coal in coke ovens.

instead, a volume of gas oil was added daily to the circulating liquor. This gas oil extracted a considerable proportion of the naphthalene vapour and, in addition, any solid naphthalene deposits were also dissolved. The spent oil was separated from the condensed liquor and fresh oil was added daily. To our surprise, the extraction of naphthalene by gas oil and the cooling of the gas by cooled ammoniacal liquor operated simultaneously in the same vessel quite happily. The oil usually formed a loose emulsion with the liquor, and any separation of naphthalene in the rack coolers was prevented.

Rapid Corrosion of Condenser Tubes

Some trouble was experienced, at an early date, with rapid deterioration of the tubes in the primary condensers. Preliminary examination suggested that both the tube material and the water used for cooling might be contributing to this.

The substitution of softened town water for tidal river water which was being used gave considerable benefits, and the use of hot-rolled tubes in place of cold-drawn tubes was also found to be of considerable advantage, probably due to the absence of stresses caused during cold drawing. Since that time, further improvement has been obtained by continuous-pressure sand filtration of the closed-circuit cooling water to remove the dirt extracted from the air passing up the water coolers. Tube life is now very satisfactory.

Blockage of Regenerators

Another interesting problem, which arose after some five years' operation of the plant, was that the resistance of the oven regenerators to the passage of gas began to rise.

Investigation showed that a heavy, powdery deposit had been formed and in some cases sintered to the chequer bricks. Analysis of the deposits indicated a considerable proportion of alkali chlorides and sulphates. After much investigation, it was found that the traces of tar fog left in the producer gas after cooling and scrubbing, amounting to some 10 to 15 gr. per 100 cu.ft., contained these materials, and samples of tarry deposit taken from all parts of the producer gas mains and fans indicated that a proportion of inorganic salts and fly ash, in addition to pitch, was present. In the regenerators, the pitchy matter was, of course, burned off, leaving the inorganic salts, contaminated by fly ash. The fly ash came from the producer fuel, and the alkali salts mainly from the water used for coke quenching and in the producer gas scrubbers.

Many methods of removing this tar fog from the producer gas were tried, such as the provision of Venturi orifices fitted with sprays, boosters fitted with sprays, and many other schemes. All these were partially effective, but all consumed a considerable amount of power. An alternative method of attacking the problem, namely, replacing the chequer bricks for the first 6 ft. depth of the generators, had, however, already been successful. With experience, much greater depths of chequer bricks were replaced and an improved form of chequer brick was devised so that the operation of the ovens was not impaired.

Determination of the size of the particles present showed that electrostatic methods of precipitation were suitable, and after much consideration, but, unfortunately, no pilot experiment, an electrostatic detarrer was installed. This detarrer cleaned the gas completely, but merely transferred the trouble to the new unit of plant, since it was more difficult to clean the detarrer itself than to re-pack the generators.

The problem of removing the deposits lies in the fact that no single solvent will dissolve the three main constituents. The alkali salts are water-soluble, but insoluble in oil, while the reverse is true in the case of pitch. Once the pitch is deposited as a layer on the surfaces, even a solvent such as hot creosote oil attacks it only slowly. The ash is, of course, insoluble in either water or oil. The standard methods of vibrators (used to remove dry dust), water-washing or oil-washing are not, therefore, effective.

Finally, it was found necessary to add an additional impurity so that the resulting mixture deposited simultaneously would flow. Substances such as soap solution, caustic soda, and tar oils were tried and, after many abortive attempts, it was found that the addition of about 2 gal. of a suitable tar oil in the form of a smoke to each 1 mill. cu.ft. of gas rendered the deposits fluid.

Fine Solids in Tar

Another problem of interest, which is believed by the authors to be common to practically all coke oven plants, may be referred to at this stage although it was really dealt with at a later date, *i.e.*, the problem of deposits forming in tar storage tanks.

After a few years' working, a layer of granular pitchy deposit accumulated and in many cases amounted to 4 or 5 ft. thick. This deposit blanketed the steam heating coils and caused troubles with the water content of the tar. Investigation showed that the deposit consisted mainly of small particles of from 0.1 to 1 mm. dia. composed of cenospheres and semi-carbonized coal that had, presumably, been carried away in the gas during charging.

The deposits consist of relatively coarse particles and must not be confused with the 'free carbon' in the tar; this is very much finer and does not normally settle out. Cleaning the tar separators and tanks was an expensive and filthy operation. An enquiry was instituted into the possibilities of reducing water in the tar by the use of a continuous centrifuge. In this form of centrifuge the bowl is fitted with sapphire jets of

Fig. 4. The Russell screen for the removal of solids from tar.

1 mm. bore in the periphery. The centrifuge reduced water in the tar down to 2% quite readily, but to avoid blockage of these jets the complete removal of the coarse solids was necessary. At first, edge filters of the self-cleaning type were used, with a limited amount of success.

At this time the authors were introduced to the Russell Contruction Company, who manufacture open vibrating screens and offered to supply on test for this purpose a screen of their manufacture. The screen (Fig. 4) was very successful and will pass hot coke oven tar at a rate of 1,000 to 1,200 gal. per hr. through a 120-mesh screen. This removes the solids continuously, and the screen cloth neither blocks nor blinds. The cloth lasts for about 1 to 1¼ mill. gal. of tar. With a finer screen of 200 mesh, the rate of flow is reduced to 400 gal. per hr. and the cloth life is about 250,000 gal. The crude solids removed amount to about 1% of the weight of tar and contain about 20% of dry solids.

Separators and storage tanks constituting the tar plant have been cleaned out and remain clean for long periods. Not only is tank cleaning avoided, but the steam coils can now heat the tar properly and so facilitate water separation. One storage tank through which 10 mill. gal. filtered tar has passed still shows no signs of sludge. The successful operation of our tar plant renders the use of a centrifuge unnecessary.

Irregularity in Temperature in Three Middle Hairpin Flues

The only problem in the heating of the battery was a slight difficulty in maintaining temperatures in the middle three hairpin flues when the ovens were at full load. As most people will be aware, the Koppers heating system is remarkably simple and symmetrical. Under each oven are two regenerators divided in the middle of the length of the oven. (Fig. 5.) Alternate ovens have gas and air regenerators underneath them respectively. Each of the two regenerators under one oven has an extension flue over the other regenerator, crossing in the middle and forming the so-called 'scissor' flues, each of which is connected to alternate sides of the hairpin flue. The heating difficulty was traced to the fact that where the two flues crossed there was a slight restriction of area in the branch flues, which altered the air: gas ratio from the optimum. These flues were increased in cross-sectional area in later units and the trouble has been completely removed.

The first of the original two batteries was reset in 1946 after handling over 3 mill. tons of coal, equivalent to 100,000 tons per oven. The other battery will be reset next year when it will have handled nearly 4.5 mill. tons, equivalent to 150,000 tons per oven.

Considerable differences have been noted between pre-war and postwar operation. Originally, the plant was designed to operate on dry, cleaned coal with about 3% water. Now, with mechanization in the mines, a large and increasing proportion of the coal is washed and water contents of 6 to 10% are common. Chute angles in the coal plant are not suited to this wet coal and frequently the hammer mills require bypassing, and wide variations in coal grinding are experienced, with consequent variation in charge weight. As originally operated, with centre-hole charging only and using dry coal ground to 80% through ¼ in. screen, the charge weight was 16½ tons per oven, equivalent to 19 tons of coal carbonized per oven per day. With three-hole charging and similar coal conditions, the charge weight rose to 17½ tons. Under similar conditions, with the wetter coal, ground to 50% through ¼ in., the charge weight has risen to 18½ tons and the throughput per oven per day to 20.3 tons. Provided the flue temperatures are accurately adjusted to the changed conditions, there is little change in the efficiency of carbonization. Gas volume and quality are, of course, accurately measured and recorded continuously. Gas quality is maintained at about 570 B.Th.U. per cu.ft.

Overall experience with the first two batteries has been so successful that three further batteries have been erected: the complete unit will be capable of dealing with 3,000 tons per day. It is interesting to record the changes included in the later batteries, which are briefly summarized as follows:—

Producer Plant

Little change in principle has been effected here. The jacket steam pressure has been raised from 7 to 10 lb. per sq. in. to facilitate the utilization of this low-pressure steam. Individual scrubber coolers to each producer are now packed with ceramic Raschig rings, and electrostatic detarrers of the wire-in-tube type were included in the later plant. With the cleanliness of the gas improved, the producer gas and air blowers are of a higher overall efficiency since they have no troublesome deposits to deal with.

Stoking Machinery

Many detailed improvements were made in the light of the previous 20 years' experience. As an example of these, the loading on the running wheels of the pusher machine was found to be extremely heavy, and this was corrected by the provision of four two-wheeled bogies so that the loading per wheel was approximately halved. In addition, the driving gear for the longitudinal travel was effected by the provision of two independent-motor driving units instead of the one central driving unit with a long springy cross-shaft. On this machine, as on the coke guide, the provision of fluid couplings made an enormous advantage, particularly on the door extraction gear. The coke guides, which were rather cramped in design, were completely rearranged on a larger and stouter chassis.

Ancillary Plant

It was in connection with this plant that the most substantial changes were made. Experience had shown that the gas from these coke ovens required quite careful treatment in order

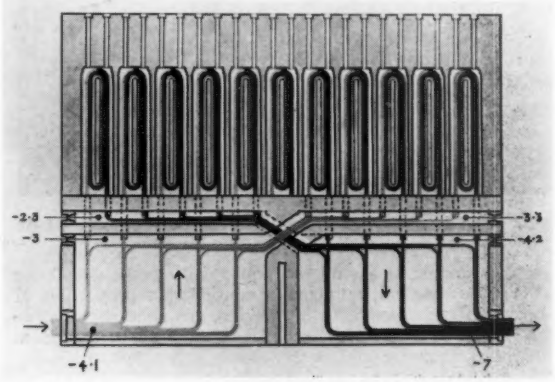

Fig. 5. Showing the travel of gases in the Koppers recirculating oven.

to deal with the naphthalene and to prevent any pitchy deposits in the collecting mains. The following is a brief description of the plant from the batteries onwards.

The principle adopted was, first, to roughly cool the gas in multipass reversible water-tube condensers, in order to remove most of the heat and the bulk of the tar and naphthalene. As, however, the cooling surfaces would be fouled by the deposited tar and naphthalene, provision was made for reversing con-

(*Continued on p. 521*)

An aerial view of the gasworks at Harrison, New Jersey.

Harrison Gasworks

This works of the Public Service Electric and Gas Company of New Jersey were visited by delegates to the recent 6th International Gas Union Conference in the United States, and in this article we give a brief description of the plant.

HARRISON gasworks, built in 1926, serves as the base-load plant of the interconnected gas manufacturing plants that supply northern New Jersey. Other gas plants supplying northern New Jersey are located in Jersey City and Paterson. The gasworks at Harrison ranks as one of the largest and most efficient gas plants in the country with an average daily output of 90 mill. cu.ft. and a peak capacity of 286 mill. cu.ft. per day.

The final product at Harrison gasworks is a mixed gas composed of carburetted water gas, thermal reformed natural blue gas, catalytic reformed natural gas, straight natural gas, modified gas, coke oven gas, and, finally, on peak load operation, catalytic reformed kerosene and liquefied petroleum air gas.

Raw Material Handling and Storage

The plant's location, along the Passaic River and the Pennsylvania Railroad (see titleblock), provides flexibility in the handling of the major raw materials: generator coke, gas, oil, boiler fuel, liquefied petroleum and natural gas. Two 30 in. belts convey the daily supply of solid fuel to the screening tower where the generator fuel is screened. The boiler fuel and coke screenings are conveyed over belts to the two 200-ton boiler house coal bunkers. The sized generator coke is conveyed and stored in the 750-ton continuous bunker in the generator house.

Gas oil is pumped directly from tankers to the three oil storage tanks. Gas oil pumps draw it from the tanks, pump it through heaters and to the generator house where it is used in the manufacture of carburetted water gas. Liquefied petroleum (LP) may be pumped from 10 tank cars at a time to any of the twenty-four 30,000 gal. LP tanks, or to a 12,000 barrels hortonsphere. Natural gas is received from two natural gas pipelines at pressures from 300 to 400 lb. per sq. in. at the natural gas metering stations. Fig. 1 shows the process flow sheet for Harrisons gasworks.

Generator House

The major equipment in this house consists of eight carburetted water gas machines (Nos. 1 to 8), which are of the hand-clinkered type, and one (set No. 10) which has a mechanical grate. Set No. 9 has been converted to a cyclic catalytic reformed (CCR) type, similar to Nos. 11 and 12. All sets are under automatic control and are equipped with an individual air blower and waste-heat boiler. The output of these boilers supplements the high pressure steam generated in the boiler house.

Carburetted water gas machines, Nos. 1 to 8 and No. 10, can produce either carburetted water gas (CWG) or thermal reformed natural blue gas (RN), while Nos. 9, 11 and 12 will produce cyclic catalytic reformed (CCR) gases using natural gas, liquefied petroleum or kerosene as base stocks.

Auxiliary equipment in the generator house includes two hydraulic pumps to supply water pressure to operate the valves on the gas sets, and a 1,000 kVA turbo-generator to supply emergency electric power in case of a failure in the normal power supply. The exhaust steam from the numerous turbine-driven pumps, fans, exhausters and compressors throughout the plant, is recovered in two accumulators from which it is automatically regulated to flow to the gas sets as process steam.

Gasmaking Processes

Carburetted Water Gas

The generator contains a bed of coke which is heated to incandescence by means of an air blow. Secondary air is admitted at the top of the generator. The products of the blow pass down through the carburettor and up through the checker brick in the superheater, then through a waste-heat

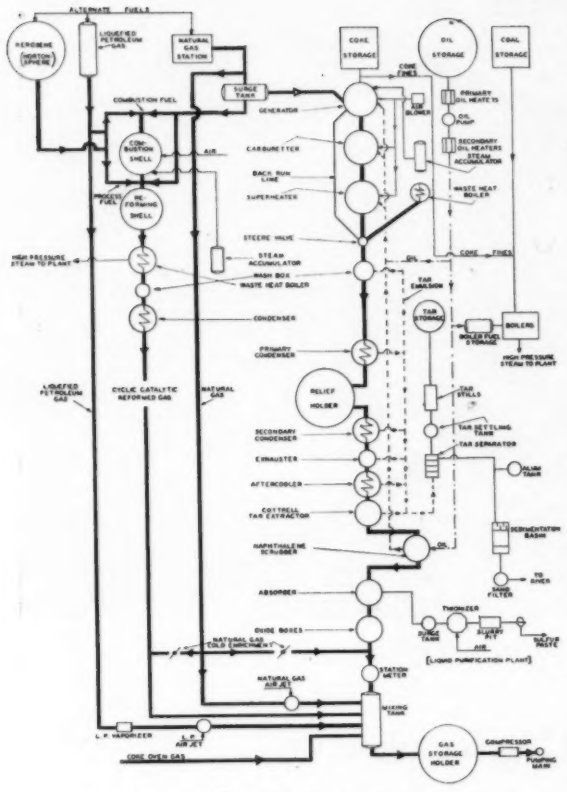

Fig. 1. Process flow-sheet for Harrison gasworks.

boiler and finally up the stack to atmosphere. Blue gas is made on the up run by admitting steam at the base of the generator, passing up through the incandescent coke producing carbon monoxide and hydrogen. This mixture is enriched by spraying oil into the top of the generator and carburettor, the oil vapours being cracked into permanent gases in the superheater. Tar is partially dropped out as the gas passes through the wash box and more completely in the condensers, relief holder and Cottrell precipitators. In the back-run steam is admitted at the top of the superheater, the gases becoming superheated in passing down through the checker brick. Additional heat is extracted in the carburettor and generator. At the top of the generator, 'oil for reforming' is sprayed and cracked in passing down through the incandescent coke, returning to the wash box by way of the back-run line. Another up run of short duration follows to purge the set, after which a final purge of air precedes the return of the blow, the start of a new cycle. After eight or nine such cycles, each of four minutes' duration, further coke is added to the generator.

Thermal Reformed Natural Gas

For this, basically, the sequence as used in the carburetted water gas process is used with natural gas as a raw material. It differs in that natural gas is passed up through the coke bed on the up-run together with the steam, then used alone or with a small amount of steam on the back-run. It essentially replaces the oil used in the carburetted water gas process. The products of this process are also principally carbon monoxide and hydrogen together with the unreacted portion of natural gas, which is mostly methane. This type of base gas is usually referred to as 'reformed natural gas'.

Cyclic Catalytic Reformed Gas

While the 'cyclic catalytic reformed' (CCR) units also produce water gas, they do so without the use of coke. In this process, natural gas, or a substitute fuel, when passed with steam through a nickel catalyst bed at a temperature of 1,400°F. to 1,450°F., is cracked to carbon monoxide and hydrogen. At the end of the run the catalyst bed is heated by the combustion products of natural gas and air. The alternating heating and reforming periods constitute an automatically-controlled two minute cycle. The CCR units reform natural gas much more efficiently than in the thermal reforming process. Liquefied petroleum gases and kerosene are substituted for natural gas when cold weather demands the use of natural gas in quantity at other locations in the plant.

Cold Enrichment

Since the calorific value of the previously-mentioned gases may vary from about 350 to 510 B.Th.U. per cu.ft., straight natural gas with a greater calorific value is automatically added to the purified base gas until its calorific value has been raised to 557 B.Th.U. per cu.ft.

Modified Gas

In this process natural gas under pressure is passed through a nozzle or jet, the rapid expansion thus effected creating a partial vacuum which causes a certain quantity of air to be drawn into the gas stream. The calorific value of the resultant gas is 557 B.Th.U. per cu.ft. Twenty jets of various sizes, from 4 in. to 16 in. diameter, are used to produce whatever quantity is required. Their operation is controlled in the control room by means of electrical push buttons, flow indicators, calorimeters for B.Th.U. indication, and instruments for the measurement of specific gravity.

Liquefied Petroleum Air Gas (LPA)

Liquefied petroleum gas, propane and/or butane, is similarly used (as in modified gas) by first passing the liquid under pressure through vaporizers and then through jets to effect a mixture of LP gas and air having a calorific value of 557 B.Th.U. per cu.ft. This type of gas is used only when peak capacity is required.

Purification and Relief Holder

The cooling of the raw gas is accomplished in three stages; in (1) primary gas condensers, (2) secondary gas condensers, and (3) aftercoolers. Tar fog in the gas is condensed and recovered in each of the above condensers during cooling, and the remaining tar fog is removed by five Cottrell tar precipitators. The removed tar and water emulsion is collected in two tar separators. Naphthalene is removed from the gas by scrubbing the gas with a light oil in the three naphthalene scrubber towers.

The removal of hydrogen sulphide from the gas is accomplished by scrubbing in the four absorber towers that form part of the liquid process of gas purification. The sulphur impurity is recovered by the flotation process as a finely divided solid, the recovery taking place in eight thionizer towers. Air compressor pumps and sulphur filters required in this process are located within the purification buildings. Last traces of hydrogen sulphide are removed in eight oxide boxes, which contain a mixture of iron oxide and wood shavings.

The relief holder is of the water-sealed type, having three lifts and a capacity of 750,000 cu.ft.

Ancillary Plant

Meter House and Control Room

The meter house is divided into two sections. The station meter area contains two wet-drum meters, each having a 6 mill. cu.ft. per day capacity, and four dry meters, each having a 20 mill. cu.ft. per day capacity. Only the base gas and enrichment gas are metered here. The other gases are metered by orifice meters. The second section of the meter house is the control room containing control equipment, calorimeters, calorimixers, specific gravity recorders, flow indicators, an oxygen recorder, a methane recorder, and test burners.

Boiler House

Major steam requirements are furnished by six B & W boilers. Boilers Nos. 1, 2, 3 and 4 are 615 h.p. chain-grate stoker fired and burn anthracite coal and coke breeze. Boiler No. 5 has a capacity of 100,000 lb. of steam per hour and is designed for liquid or pulverized fuels. Boiler No. 6, of 139,000 lb. of steam per hour capacity, is designed for liquid and gaseous fuels. Operating pressure is 225 lb. per sq. in. and 100°F. superheat is provided.

Solid fuel is supplied *via* two 4-ton travelling lorries. Liquid fuel is pumped from two 14,000 gal. storage tanks. Five forced draught fans, two induced draught fans, three boiler feed pumps, a pulverizer and two Cochrane tray-type de-aerating feedwater heaters constitute the major auxiliary equipment. An automatic combustion control system maintains the proper air/fuel ratio in the furnaces and ash removal is accomplished automatically by a sluice way and settling basin.

In the basement, there are four salt water pumps that supply water to the gas condensers. These pumps take their suction

from a canal that runs from the river to the boiler house. Also located in the basement is a fire pump used to supply water to the fire-fighting equipment.

By-products

The major by-product is tar and this is recovered as a water-tar emulsion. Treatment consists of dehydrating the tar in settling tanks followed by final dehydration in steam stills. Dry tar is stored in storage tanks: this tar is further processed to meet specific industrial requirements.

Filter House

The major equipment here consists of: (1) a sedimentation basin, alum tanks, and sand filters used in treating waste water before its return to the river, (2) five boiler feedwater softeners, (3) four circulating water pumps supplying water to the wash boxes on the gas sets, and (4) tar and light oil pumps.

Gas Storage

Total works storage consists of a 5 mill. cu.ft. water-sealed, five lift holder, a 3.2 mill. cu.ft. water-sealed four-lift holder, and a 15 mill. cu.ft. waterless or tar-sealed holder which is twenty-eight sided, 254 ft. across corners, and has an overall height of 378 ft.

Compressor and Exhauster House

The four turbine-driven exhausters are of the centrifugal type. The two larger exhausters exhaust into barometric condensers located outside the building. The other two exhausters exhaust their steam into the low pressure steam header. The function of the exhausters is to pump gas from the relief holder, through purification equipment and meters, and into the storage holders.

There are four GE 5-stage gas compressors, each driven by a direct connected 2,500 h.p. mixed-flow condensing turbine, and capable of pumping 1.5 mill. cu.ft. per hour at 15 lb. per sq. in. pressure. The compressors pump the gas from the storage holders out into the distribution system. In addition, there are two Elliot 5-stage compressors, each driven by a 4,650 h.p. turbine and each capable of pumping 3 mill. cu.ft. per hour, also at 15 lb. per sq. in. pressure. In the basement are located the auxiliary equipment, the jet condensers, jacket cooling water pumps, and automatic strainers on the condenser cooling water.

COKE OVENS—From p. 518.

densers easily by air-operated valves, thus melting the naphthalene into the tar. The gas would not be brought to a very close approach temperature to the cooling water, but the greater part of the heat in the gas would be removed. The gas then passed to the turbo exhausters, which would inevitably remove a further proportion of tar fog and slightly superheat the gas. The problem then was to remove the remaining impurities in such an order that the removal of each facilitated the removal of those following.

From the exhauster, therefore, the gas passes to an electrostatic detarrer, which completely removes the remaining tar fog. Once this tar fog is completely removed, it becomes possible to wash the gas with gas oil in efficient multi-stage washers and thereby remove completely the remaining naphthalene, which is present as a vapour. The spent oil from these washers was circulated continuously through a small, but efficient, still. The benzole and naphthalene vapours pass back into the inlet of the primary condensers and the regenerated oil is cooled and re-used.

Having removed the naphthalene, the gas can then be completely cooled in a secondary condenser without the cooling surfaces being fouled, so that the gas temperature can be brought very close to that of the cooling water. This thorough cooling does, however, result in the formation of a small amount of oil fog due to the gas having picked up some oil vapour when it was washed by oil at a higher temperature. This trace of oil fog is undesirable in that it would form an oil film on the wetted surfaces of the ammonia washers which follow, and it is, therefore, removed by a second detarrer.

The gas from this detarrer is then properly cooled and cleaned and can be washed at high efficiency in a multi-stage ammonia washer.

The efficiency of this washer remains at a very high figure even after years of operation. This logical arrangement of plant has proved very reliable for many years and operates at high efficiency. This is particularly desirable in the case of coke oven plant, since the period between resetting of the carbonizing plant appears to be about 25 years.

The capacity of Beckton is now at a convenient limit for the area available when due allowance has been made for adequate coke and coal-storage space. The only further possible opportunity of extending the coke oven plant, therefore, would be during any replacement of retort houses. As coke oven plant would require the greatest ground space a suitable area has been allotted for this purpose as 'gas-manufacturing area' and the proposed new ancillary plant plus the tower purifiers for the existing retort houses are placed on a site that will suit either the existing retort houses or any new gasmaking plant; in this way, an orderly sequence of construction is possible, which will allow us to replace the most urgently needed units immediately and to follow in turn with the later development.

This, then, is the tale of the Beckton coke-oven plant, which forms no mean chapter in the history of The Gas Light and Coke Company and the North Thames Gas Board; it records the efforts of many people, from Mr. Thomas Hardie, who was the Chief Engineer of The Gas Light and Coke Company at the inception of the plant, to Dr. J. Burns, G.M., the Chief Engineer of the North Thames Gas Board, when the plant was completed. It also indicates our hopes and expectations and their fulfilment over the years; it deals with the problems that arose and their cure, and finally with the extension of the plant to its present size, processing 3,000 tons of coal per day. This unit, producing 37.5 mill. cu.ft. of gas per day, plus the two new adjacent water gas plants with an installed capacity of 42 mill. cu.ft. per day, represents roughly half of Beckton's output; and now, faced with the ultimate replacement of the remaining half, we look with anxious eyes at the coal supply position.

CHRISTMAS LECTURE FOR YOUNG PEOPLE

The fifth Lecture to be held under the ægis of The Institution of Gas Engineers will be given, by kind permission of the Rector and Governors of the Imperial College of Science and Technology, in the Main Chemistry Lecture Hall of the Royal College of Science in Imperial Institute Road on January 3, 1956, at 2.30 p.m. The lecturer will be Mr. L. W. Andrew, B.A., B.Sc., M.Inst.Gas E., and the title will be 'Harnessing the Flame.'

This lecture will consider the best use of the various types of flame discussed in the previous four lectures of this series. Practical demonstrations will cover heat outputs of individual flames of a range of several thousands to one. It is hoped to use coloured slides to demonstrate the use of larger flames. The problem will be considered initially in terms of familiar scientific principles and then in terms of present-day and future applications to home and industry. Admission to the lecture will be free and tickets may be obtained from The Secretary, The Institution of Gas Engineers, 17, Grosvenor Crescent, London, S.W.1, after December 1, 1955. The accommodation is limited to approximately 250.

It is suggested that those who have not already done so, would find it an advantage to visit the Gas Gallery of the Science Museum either before or after the Christmas Lecture.

More oil is being used in the manufacture of gas, and the figures for September issued recently in the official '*Monthly Digest of Statistics*,' published by the Central Statistical Office, show that the weekly average has risen to 4,420 tons of oil. But the highest figure recorded since 1935 was achieved in March this year, when it stood at 17,620 tons. With this and 465,000 tons of coal, gasworks manufactured 8,210 mill. cu.ft. of gas as a weekly average.

Chemical Laboratories in the Gas Industry*

By L. G. TOWNSEND, M.Sc., M.Inst.Gas E., F.R.I.C., M.Inst.F.†

Part I

It is now universally recognized that the process of coal carbonization, which is essentially chemical in nature, can only be efficiently conducted when an adequate staff of scientifically trained personnel is available. This recognition of the part which the chemist, chemical engineer, physicist and so on plays, has only been achieved after many years of enlightened policy by the larger gas undertakings. Recognition of the role of the scientist in the gas industry has kept in step with the increasing interest in science and scientific research by industry as a whole, and it would be true to say that increasing knowledge of the basic scientific principles involved in the process of coal carbonization and ancillary operations has enabled the industry not only to maintain, but to improve its contribution to the national fuel economy. It is likely that this contribution will be increased considerably in the immediate future, in view of the pressing need to reduce atmospheric pollution, by the combustion of smokeless fuels in the requisite quantity, which at the present time only the carbonizing industries can supply. There is evidence on all sides that, at the present time, the industry is tending in the direction of processes which have little in common with the classical methods of coal carbonization. There is also the likelihood that in the foreseeable future more emphasis will be placed on the carbonizing industries as a source of chemical intermediates and specially prepared domestic smokeless fuels. The operation of these new processes will have to be controlled and perfected by the scientific staff available on the works, who play an important part in translating the results of research into practical improvements in day-to-day operation.

Scientific Services in the Gas Industry

While certain area boards are in a position to conduct research, in consultation with the gas council, this will not be a primary responsibility of an area board and the main research effort for the industry will spring from the research centres maintained by the Gas Council. Little or no fundamental research will be carried out at area board level in normal circumstances. On the other hand, operational research into the performance of existing plant will frequently claim the attention of area boards and this type of work invariably calls for chemical services.

In a large and progressive board the demand for scientific services will be more or less continuous since the number of projects will be considerable, and as one is completed a further will claim attention. The question, therefore, arises as to the advisability or otherwise of maintaining a Central Area Laboratory. There is no doubt that many of the projects mentioned above can be covered by the chemical staff of the Group Laboratories, although there are certain occasions when specialized services and unusually expensive apparatus are called for. For example, the examination and testing of refractory materials, the control of paint quality, the examination of lubricants all fall in this category. In the case of important raw materials of this kind it is almost essential that they should be supplied against a specification. There is, however, little point in drawing up a specification unless facilities are available for assessing the compliance or otherwise with it.

Group Chemical Control

The organization of the Chemical Department at the Liverpool Group of the North Western Gas Board was fundamentally altered some eight years ago when some measure of centralization was introduced at the same time as the position of the works chemical staff was redefined. The present arrangement is the outcome of these alterations, and perhaps the greatest benefit has accrued from the new status of the Principal Chemist on the works. The Principal Chemist and his staff come under the immediate control of the Station Engineer and his duties are mainly concerned with the day to day operation of the plant on the works. This means that the laboratory staff immediately become of practical assistance to the Station Engineer in the running of the works and they can take considerable responsibility. The obvious and immediate effect on the chemist and his staff is that they spend a great deal more time on the works than was previously the case and, although they do not directly deal with labour they are responsible for its deployment. The Principal Chemist becomes, thereby, more in the nature of an additional Assistant Engineer. There have been several instances of Works Principal Chemists who have progressed to Station Engineer in this manner. There is no reason to believe that this avenue of promotion will become narrower as new training and education schemes come into operation, although it is essential that a qualification of some kind be gained on the way. In this connection, it does not always matter a great deal that a person who is to take up an engineering post possesses no qualification in engineering. It is the fact of having taken a course of scientific training which really counts.

One immediate outcome of the changes outlined is that the chemist on the works is relieved of a great deal of routine chemical testing. It was, however, fully appreciated at an early stage that this process should not be carried too far and there was a limit to the tests which could be carried out centrally.

As a general rule it was accepted that tests which were essential for the day-to-day operation of the works should be carried out on the works. On the other hand, the examination of raw materials and by-products could, with advantage, be transferred elsewhere. This would be particularly advantageous in cases where the final results had to be agreed with an outside concern. It was visualized that a certain number of works chemical staff might initially be available for transfer to any new central laboratory, but the savings in this direction were not expected to be large. The main object of the reorganization was to provide additional technical control for the works and at the same time, to provide a more specialized central chemical service, available to all the works, as well as to any other departments which might need it. The Central Laboratory would come under the direct control of the Chief Chemist and he would also be responsible for the methods of testing and the engagement of staff for the works laboratories as well as the Central Laboratory. At first, it would appear that the Chief Chemist might well be in a somewhat peculiar position with regard to the chemical staff on the works, but this is not the case in practice and the arrangement leads to far less friction than the method of dual control formerly in operation.

Development of a Central Laboratory

The Liverpool Undertaking has always operated a small Central Laboratory. This laboratory was concerned not only with production matters but also with a certain amount of appliance testing; the building housing this laboratory was destroyed early in the war by enemy action. It was later found possible to find some temporary accommodation at Garston works and a skeleton staff carried on the more essential activities of the original laboratory. The reorganization of the department called for an entirely new Central Laboratory and after a great deal of discussion it was decided to modify a building at Wavertree works for this purpose. Although not in the centre of the city the site was quite

* From the paper, 'Some Aspects of Scientific Control in the Gas Industry', presented to the Manchester and District Section of the Institution of Gas Engineers on October 27.

† Chief Chemist, Liverpool Group, North Western Gas Board.

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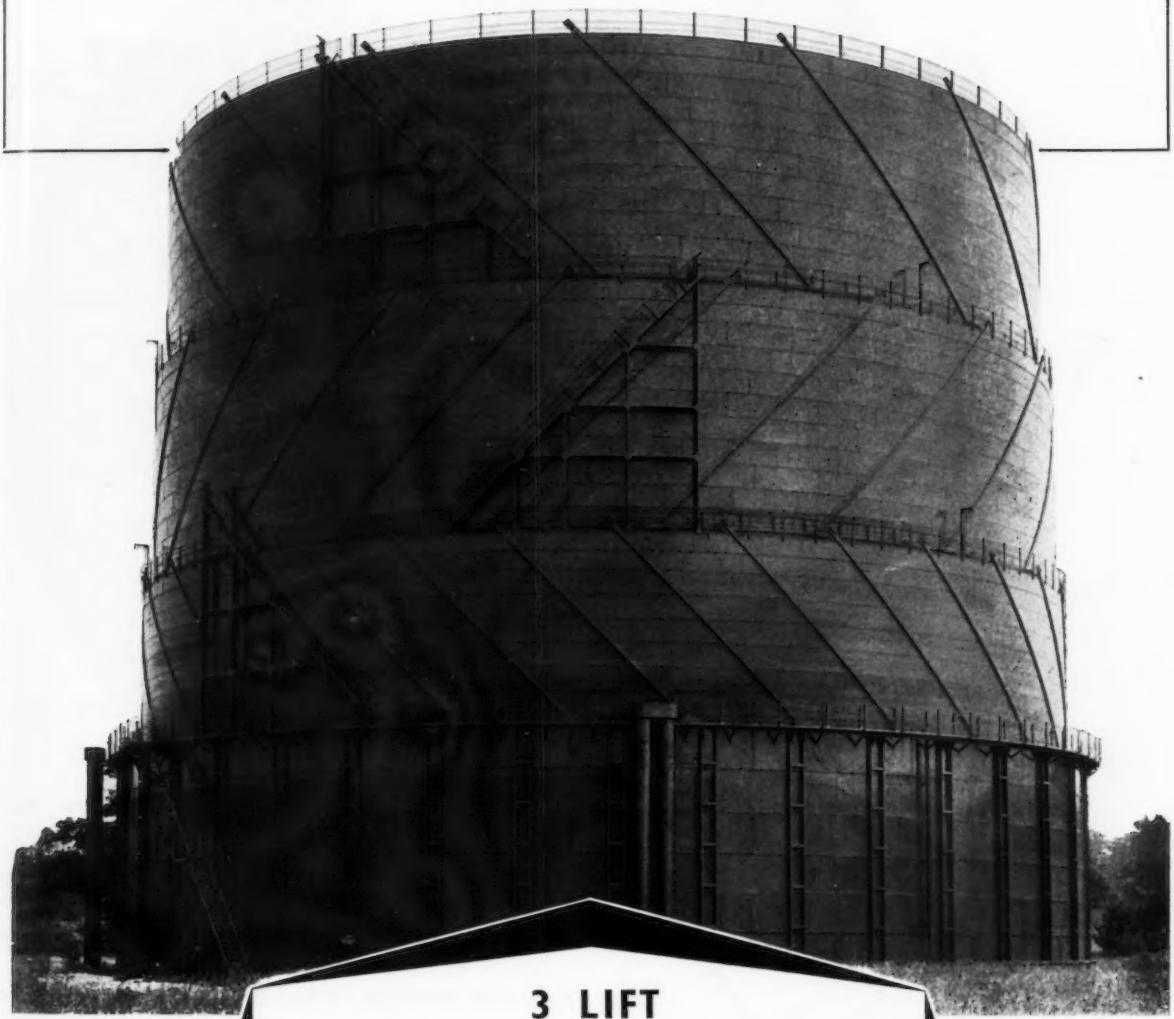

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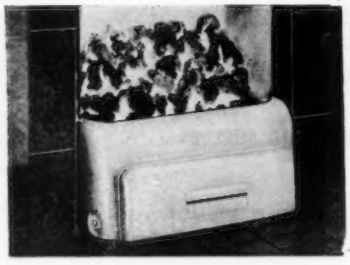

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convenient for the area of supply and early in 1947 the Chief Chemist and his staff together with one or two members of the works staff took possession of the Central Laboratory. A certain amount of specialized apparatus which had been in operation in the small laboratory at Garston was transferred, but a great deal of new apparatus was purchased. The whole suite occupied a space of 50 ft. by 25 ft. In the original project it was thought that eventually the whole question of instrument maintenance would have to be dealt with in a centralized manner, but no provision for this was made at the outset. It was also appreciated that the new laboratory, which had actually occupied the only available site, would not be as large as was originally visualized. This shortage of space soon became evident particularly in connection with the sampling and analysis of coal, and in 1951 an additional adjoining building was constructed entirely for the preparation of coal and coke samples and their subsequent examination. At this stage the question of instruments and their maintenance was becoming more and more insistent and certain modifications were made within the existing building to provide some kind of central instrument section, where minor repairs and modifications could be carried out. A small amount of apparatus for the standardizing of instruments, particularly optical pyrometers and thermocouples, was also installed. It will be appreciated that up to this time the development work on instruments, which had been carried out with some success, was achieved under the most difficult and unsatisfactory conditions.

It is of some interest to outline the initial requirements of the original laboratory for comparison with the existing facilities after eight years, described in a later section. It was suggested that the following work would have to be covered and apparatus provided:—Coal proximate analysis and assay and ash fusion; Calorific value of solid and liquid fuels with bomb calorimeter; Coke proximate analysis; Analysis of new and spent oxide; Sampling and reduction of samples; Testing of appliances (occasionally); Simple instrument maintenance and checking.

The examination of coal, including the sampling, was expected to employ a chemist with some knowledge of the work with two assistants (possibly female) and a sampler. It was hoped that they would also be able to deal with the rather smaller number of coke samples. At the minimum there was a total of 45 samples anticipated each week, but later a certain amount of additional work on coke quality involving the determination of C.A.B. and the fire performance was expected to develop as staff became available. It is interesting to record that at the time of the change over, the one-thousandth of a ton coal test was in use for assessing coal yields, but was abandoned when the laboratory moved from Garston to Wavertree in favour of the Gray-King Assay. There was considerable speculation at this time as to the best procedure to be adopted for transferring coal samples from the works to the Central Testing Laboratory, even to the point of considering the provision of a mobile crusher. There was also some doubt as to the degree of accuracy required in such a system of coal sampling since it affected so greatly the amount of coal which would have to be carried about. These matters have since been resolved in the manner described later. Calorimeters of the Scholes Bomb and Jones Miller pattern were new acquisitions which became immediately useful, particularly in conjunction with the new assay apparatus. The grading of coke samples was retained at the works for obvious reasons.

The testing of all consignments of products for sale was clearly an immediate task and was mainly carried out on apparatus which had been recovered from the works. On the other hand the testing of other raw materials such as gas oil, oxide and other chemicals used in purification and water treatment and possibly paint analysis was a new departure and this was expected to take up the time of two further assistants. Facilities were provided for the testing of gas oil for gas manufacture by submitting it to a small scale cracking process in a silica furnace and collecting the gas for yield and examination in a five cubic foot gasholder. Group analysis of gas oil was also to be carried out with the object of correlating the results with the previous test and, if possible, finally eliminating it as being far more tedious.

The amount of attention given to instruments at this stage was not large but the progress in instrumentation which was taking place on the works at this time indicated that they would make increasing calls on the chemical staff for assistance with repairs and maintenance and the nucleus of the instrument section was in existence at this time. It is notable that the care of instruments has always passed to the works laboratory as a tradition which it is convenient to continue. Also of interest is the fact that the new calorimeter room at the Garston works which was a model of its type was completed in the same year that the Central Laboratory was established. It was then possible to centralize the maintenance and servicing of all the calorimetric apparatus throughout the Company (as it then was), and this effected a considerable saving in the stock of apparatus carried. Fairweather recorders were coming into increasing use both for works and official use and certified apparatus was standardized for both purposes. It was not decided at this stage to provide centralized control for all instruments. A very useful adjunct at this stage was a one cubic foot bottle standardized with some considerable care which was to be used for the testing of all meters used in calorimetry. Apparatus for standardizing various types of pyrometer was installed and this activity was expected to increase considerably both in amount and scope. A certain amount of development work was also in progress notably on the automatic recording or hydrogen sulphide concentrations in gas and a senior physicist was in charge of this and other work connected with instrumentation, *e.g.*, automatic C.V. control.

It was fully intended that provision should ultimately be made for the investigation of works problems which, heretofore, had been carried out in a rather spasmodic manner by the works themselves. Purification was also a subject on which further work was visualized. At the same time it had been possible in the past for works to carry out tests on carbonizing plant and C.W.G. plant of a rather prolonged nature, for example fuel consumption tests, only by dint of considerable hard work by an inadequate staff. It was hoped that this type of test would in future be carried out far more expeditiously with the assistance of skilled staff from the Central Laboratory, and, as a result, such tests would be carried out with a frequency more in keeping with their importance. The idea of a mobile plant testing team was always under consideration, although it posed a very difficult problem owing to the intermittent calls for its services.

It will be seen from the above description that the initial laboratory was comparatively modest in conception, although capable of rapid expansion. The original staff visualized in 1947 was in the region of ten which did not include clerical assistants. It has always been the practice for the chemical department at Liverpool to produce a weekly statistical technical summary covering the carbonizing and gasmaking results at the various works and this was expected to continue. Extensive records were also maintained for each works in the way of technical and chemical results. A certain amount of clerical and filing work would also arise in connection with the new laboratory and a female clerical assistant was engaged to attend to such matters and to handle the work connected with the very considerable central chemical and apparatus stores which it was intended to maintain.

Works Laboratories after Re-organization

The development of the Central Laboratory had a considerable effect on the works laboratories which were stripped of a great deal of their apparatus which had been in daily use. The opportunity was also taken to remove other obsolete and redundant apparatus, some of which had not been used for years. The facilities still required were, however, as great as ever, although considerably altered. For example, apparatus for the systematic testing of retort house and other gas samples was developed immediately and a great improvement in operation resulted from the increased effort devoted to this kind of work. In the normal way, it is considered very desirable, whenever possible, that the laboratory should be sited centrally on the works, not too far removed from the administrative offices. It is not often that this is achieved, however, although on one large works a new laboratory on a central site was provided at about this time. Interest in instruments was increasing rapidly and on the larger works an assistant had spent a fair proportion of his time rendering first aid to instruments in a spasmodic fashion, although there were no instrument mechanics or engineers as such. As the opportunity arose to move or modify the works laboratories some provision was made for simple workshop facilities for elementary instrument repairs, as

it was visualized that on the larger works there would eventually be a full time instrument service engineer who would use the laboratory as his headquarters. The increasing use of Fairweather recording gas calorimeters also called for some skilled maintenance and supervision. The transportation of samples between the works and the Central Laboratory was taken care of by the normal messenger service which circulated daily between the various works and which has proved quite successful. At a later stage, however, the contact of the Central Laboratory with the works was not sufficiently close, particularly from the instrument aspect and a small van was acquired by the department mainly for the use of the instrument section, but not exclusively so. This van has not only proved very successful but is in continual use and it is now difficult to imagine how the department managed without it. It is particularly useful for bringing in large samples or large numbers of samples in connection with efficiency tests and the like, quite apart from its obvious use for transportation of instruments. It will be appreciated that the department has expanded considerably since nationalisation, partly from the additional staff and facilities taken over but also from the increases in the demand for instrument maintenance, repairs and installation. The works laboratories are adequately supplied with the containers, *etc.*, necessary for the transport of samples from the Central Laboratory, and loss of samples through breakage is very small. It was originally hoped that the whole of the works' gas analysis would be carried out centrally, but in the event this has not proved practicable owing to breakages and leakage of gas sample tubes. It was possible, however, to call in all the Bone and Wheeler pattern gas analysis apparatus which was only being used spasmodically. This was highly desirable as few people on the works had acquired the technique for its satisfactory operation. Its use in the Central Laboratory was mainly for the analysis of purified and delivery gases and for special analyses in connection with tests and investigations. The works laboratories were provided with up-to-date and much improved apparatus which gave adequate information for day to day control. In any case, it is very doubtful if the complete analysis of make gases as a routine operation can be justified, since the interpretation of the results is by no means easy.

In general it may be said that the works laboratories are completely responsible for the operation of certain plant. There is some variation in the amount and numbers of such plant between works, but the following items come under the continuous control of the laboratory: Benzole recovery, concentrated ammonia manufacture, oxide purification, water softening, coal and water gas tar preparation for sale, liquid purification plant, electrostatic detarrers, gasholder contamination. In addition to these duties the Works Principal Chemist is responsible for the return of the whole of the thermal results for the works including, of course, calorimetry. He is also entirely responsible for the maintenance of safety conditions involving explosion hazards and in this connection deals with purging operations and is responsible for the certification of enclosed vessels in respect of safety. It is of interest to record here the truly remarkable change in outlook which has occurred in this connection over the last few years. At the present time no item of plant which has contained gas or explosive vapour is opened for inspection, or put back to work without prior purging with carbon dioxide or steam. The only exceptions to this rule are purifier boxes which are at present under consideration. On a new works or one which is being reorganized the amount of time spent on this activity can be very considerable. During the year 1954-55, for example, no less than 21,350 lb. of carbon dioxide alone was used for this purpose. At all works the Chemist is also responsible for a considerable amount of retort house control work and the taking of heats. This somewhat formidable list is by no means exhaustive and on the larger works the volume of work may entail a works laboratory staff of seven or more. Routine testing of gases and the supervision of sampling (a most important task) is also the responsibility of the Principal Chemist. With the exception of the smaller works each laboratory is provided with a crusher which will reduce coal samples to ¼ in. size or rather less and facilities are also available for sample size reduction. Attached to each laboratory is a sampler and an assistant who, under the direction of the Principal Chemist, assist in the transmission of samples to the Central Laboratory; they also assist in water treatment where this is desirable, and with the taking of combustion chamber temperatures. The Principal Chemist is responsible for the accuracy of the latter for which he can call upon the services of the instrument section. He also normally submits a daily laboratory report to the Station Engineer and calls his attention immediately to abnormal figures or occurrences. The daily thermal output figures are obtained as early in the day as possible, normally by 10.30 a.m., and these figures are checked by the station clerical staff before leaving the station.

Existing Central Laboratory

The Central Laboratory at Wavertree works has a wide range of activities and it is considered of interest to describe these in some detail. It is convenient at this stage to separate the various types of work under the main headings: General routine analysis; coal and coke analysis; special works investigations; analytical investigations; instruments; works operating results; library and information.

Since the work carried out can be conveniently divided in this way the organization of the staff follows similar lines. Apart from the clerical staff attached to the department, the personnel can be divided into four main groups. Each of these groups is in charge of a Group Leader of at least Higher National certificate level, and he is entirely responsible for the results obtained by his group. These results are in turn subject to the scrutiny of the Assistant Chief Chemist in charge of the laboratory, who is also available to any of the groups to advise on methods of procedure and the like. The instrument section is also embraced in this scheme, although the workshop and staff are separate from the Central Laboratory. The Senior Instrument Engineer has also liaison with the works service engineers attached to the works laboratories.

The general routine analysis group handles all the samples, other than coal or coke, submitted to the Central Laboratory, with a few minor exceptions. All the samples received by the laboratory are recorded on receipt in the book maintained for that purpose and this also serves as a means of following the progress of such samples. This duty is primarily the concern of the group leaders, although the chemist in charge of the laboratory will also interest himself in such matters. The routine samples submitted comprise tar, new and spent oxide, gas analyses, liquors weak and concentrated, effluents, benzole and gas oil. These samples find their way to the laboratory by the usual messenger service which carries mail between the works, and special containers are necessary for their transport. In general this arrangement is satisfactory. Special apparatus has been devised to enable large numbers of samples to be dealt with simultaneously and considerable saving in time results from this practice. This group is freely provided with rapid weighing balances of a reasonable standard of accuracy and a regular maintenance service for these balances has been instituted. It is usual to carry out determinations which have to be agreed with outside concerns in duplicate, and it is unusual to find disagreement. A further duty of this group is to provide standard analytical solutions for works use which are supplied against a requisition from the works laboratory. The Central Laboratory also maintains the chemical and apparatus stock for the Group, and items can be obtained immediately from stock. It is quite certain that the total stock of such material carried is considerably smaller than obtained previous to this arrangement and the likelihood of running out of stock of an individual item in general use is negligible. Probably one of the main criticisms of the arrangements outlined is that there is some delay in the results finding their way to the works. There would be some substance in this criticism were the system operated rigidly, but it is always possible to obtain results rapidly by direct appeal to the chemist in charge of the Central Laboratory, if this is essential.

(To be continued)

Fog persisted in Manchester for four days until the beginning of this week. The Scientific Correspondent of the *Manchester Guardian* reports that after two days of fog, the state of the atmosphere in Manchester was worse than that of the most heavily polluted parts of London after the first two days of the famous fog that started on December 5, 1952. It was reported that the concentration of sulphur dioxide in the Manchester atmosphere was of the same order as the peak recorded in Lambeth in 1952.

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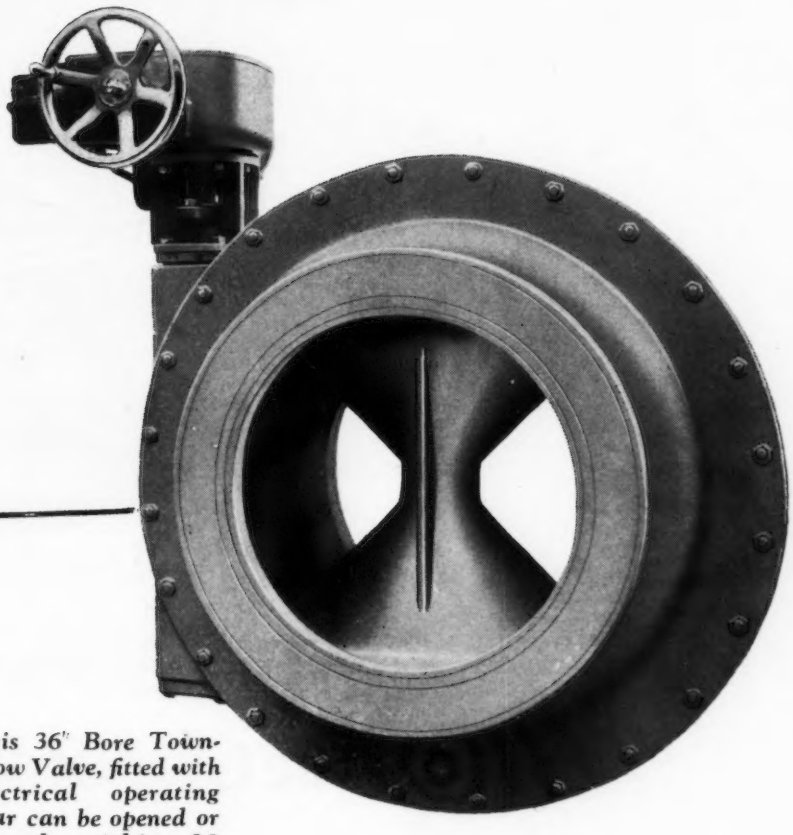

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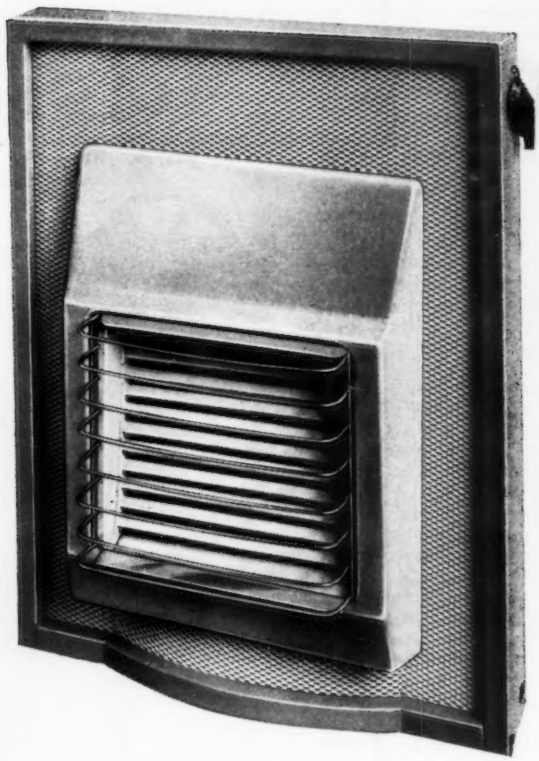

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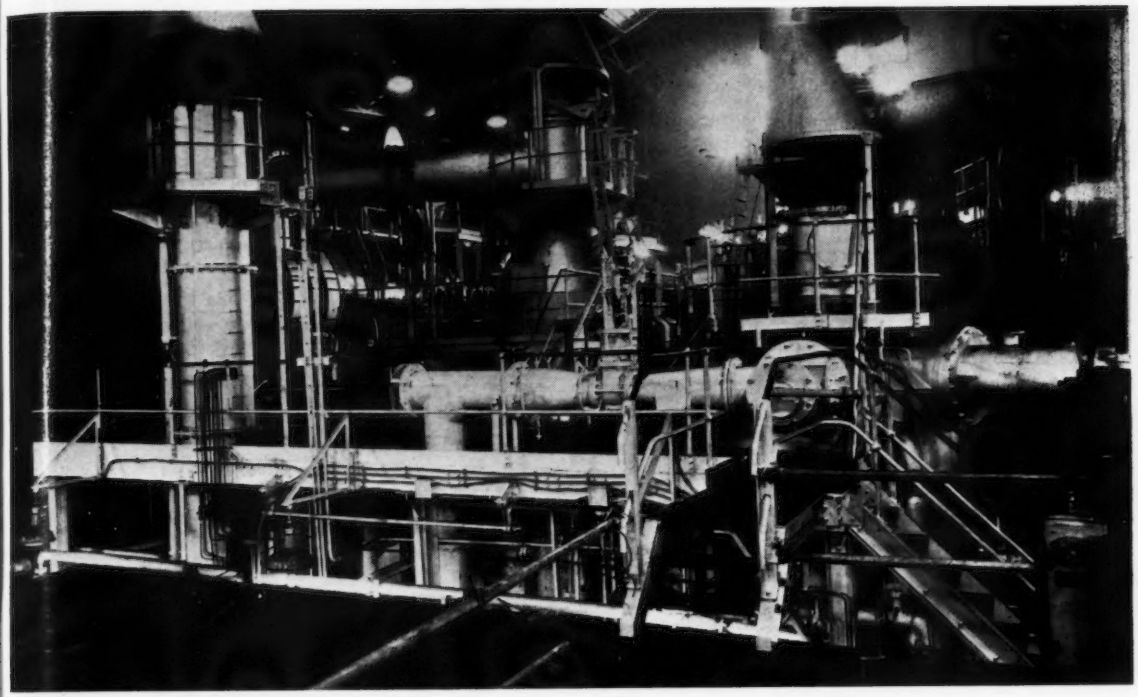

The York 'Segas' Plant

Last week (p. 471) we reported the visit of a party of German gas engineers to the SEGAS plant at York. Here is the North Eastern Gas Board's description of the plant.

CONSEQUENT upon the publication of a paper by Stanier and McKean[1] dealing with the development of the 'Segas' process for the catalytic gasification of fuel oil, the North Eastern Gas Board decided to install an experimental plant with a view to its appraisal as a standard gasmaking unit. A plant was ordered from the Power Gas Corporation to be erected at York, a location convenient to Leeds and Stockton, and this plant was completed and put to work in July, 1954.

The plant has been operated experimentally since then with full co-operation between the gas board and the Power Gas Corporation and is still regarded as an experimental unit, although at times it has usefully contributed to the gas make.

Description of the Plant

The process requires that a proportioned mixture of oil vapour and steam is allowed to react while passing through a bed of hot catalyst in the catalyst vessel. The mixture is prepared by injecting oil and steam into the steam preheater at the points shown in the diagram (Fig. 1). The oil is pumped through a heater, to reduce its viscosity, to a low pressure spray *via* a meter and a valve for regulating the rate of flow. Vaporization of the oil occurs on the chequers and in the hot free space at the top of the steam preheater. The steam is taken on this plant from the works supply, passed through a metering plate and valve for controlling the rate of flow to the base of the steam preheater, where it absorbs heat from the hot chequers therein before meeting the oil at the top. The mixed vapours pass directly to the catalyst.

The Cracked Gases

Cracked gases and undecomposed steam pass from the catalyst through the second regenerator and the air preheater which also contains chequers. The gases then pass in turn through a washbox and Lymn washer for cooling and the removal of tar and naphthalene, a static washer for the final removal of naphthalene and then through a Connersville meter. The gases then join a stream of carburetted water gas at the inlet to relief holder and then pass to the purifiers.

During the gasification of the oil heat is removed from the bed to promote the endothermic reaction, and as sensible heat in the product gases. The bed also becomes contaminated with carbon released from the decomposed oil. The bed is periodically returned to its original state by terminating the oiling or 'run' period and introducing a 'blow' period during which air is blown through the bed to burn off the carbon and reheat it by the heat generated.

The air (primary) is injected at the top of the air preheater. Heat stored during the run is absorbed, and the air is preheated before passing to the catalyst bed for combustion of the carbon. The hot products of combustion pass to the stack *via* the steam preheater where they give up heat in restoring the temperature of the chequers. During the blow a restricted amount of secondary air is injected at the top of the steam preheater to ensure the combustion of smoke-forming oil residues which may accumulate there during the run. The plant is isolated during the blow by the automatic closing of the run gas valve at the washbox outlet.

A Typical Cycle

The complete cycle is generally of five minutes duration, although a six minute cycle has frequently been used. A typical cycle is given as follows: Blow phase 48%, steam purge 7%, run phase 43% including 30% oil admission, 13% continuation steam for purging.

A steam purge is introduced before and after the run, the latter often being referred to as continuation steam since it is a continuation of the process steam after the oil is shut off. A supply of

heating gas is available at the top of the steam preheater to provide extra heat during the blow and this must generally be used.

The cycle is performed by a seven train, cam-controlled, mechanical operator which moves the various valves through linkages in the manner usual to a small carburetted water gas plant. Safety interlocks are incorporated, whereby the plant is automatically shut down if an unsafe sequence is attempted. Oil, air and heating gas would also be automatically shut off in this case.

The instruments are arranged on a suitable panel and include temperature indication for the points marked T_1, etc. (Fig. 1), pressure gauges, flow gauges for air and heating gas and steam pressure gauges. Gas is sampled into a small water-sealed holder each cycle for calorific value measurement and testing.

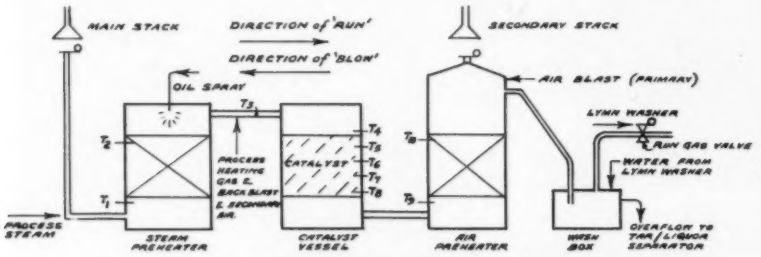

Fig. 1. Line Diagram of 'Segas' Plant.

Plant Capacity and Dimensions

The nominal designed capacity of the plant is 900,000 to 950,000 cu.ft. per day of gas at a calorific value of 450 to 500 B.Th.U. per cu.ft. The three main vessels have cylindrical mild steel shells with a suitable refractory lining for insulation. The catalyst vessel has an internal diameter of 6 ft. The two regenerators are of 6 ft. internal diameter and contain chequers. The catalyst is in the form of cylindrical shapes with hollow centres, in two sizes, 2¼ in. and 1⅛ in., and is a refractory material, magnesite containing lime.

Water Recirculation

Water for the washbox is drawn hot from the water-tar separator. The Lymn washer supply is drawn from the same separator although it is passed over a cooling tower before use. Hence both these vessels work on a closed water circuit. Moisture loss from the cooling tower is roughly balanced by the condensation of undecomposed steam from the gas, a little extra remains for bleeding off the system to keep dissolved solids at a convenient level. Acid compounds, *e.g.*, oxides of sulphur, dissolved by the water from the gases are neutralized by daily additions of soda ash to an extent where a slight acidity is maintained. Should the circulating water become alkaline hydrogen sulphide could be absorbed in the plant and desorbed at the cooling tower.

Plant Operation

A very important single operational aspect at York has been the injection of all the oil into the steam preheater, so that vapours only have been in contact with the catalyst. The advantages so gained have been that a smaller quantity of oil ash has been deposited in the catalyst. There is no thermal shock to the catalyst itself and undue increases of resistance to gas flow have thus been avoided. Hot spots within the bed have been minimized due to the more even distribution and cracking of vapours. Consequently, difficulties which arise from local excessive temperatures have been avoided. These are: Excessive naphthalene, and a thick viscous tar containing large amounts of pitchy material.

In actual plant operation the control of the catalyst bed temperature is most important, and is achieved by the use of a large excess of air during the blow period. Without the excess the bed would overheat since insufficient heat would be carried forward to the steam preheater. It was often found, however, that if sufficient excess air was used to keep the bulk of the bed cool enough, then the lower portion of the bed and also the air preheater became overcooled. Carbon and allied substances deposited in these cooler parts do not burn and gradually build up, say over a few days. While these may be readily burnt off in a short time, to do so the plant must be shut down for a short period. Successful experiments are proceeding to overcome this by introducing a restricted air blast in the reverse direction to the normal blast and immediately before it. This so-called 'back' blast injected at the top of the catalyst bed, balances heat conditions and has served to give a very uniform heat distribution within the bed coupled with a reduction in continuation steam requirements since the steam also normally serves to convey heat in the same direction. Temperature control by excess air has been very successful, and remains the only possible method.

Other Aspects of Operation

Smoke formation at the start of the blow has been virtually eliminated by devizing a low-pressure type of oil spray which gives improved oil distribution (and therefore vaporization) in the steam preheater with a decrease in residues at that point. A special vaporizing chamber is to be incorporated into future plants. Steam requirements have been consistently reduced while maintaining satisfactory cracking and temperature conditions with savings in steam used during both the oiling and purging periods. The lower catalyst bed temperatures referred to reduce the formation of tar-water emulsion, which has been suppressed by the addition of a surface reactive agent to the circulating water.

Some Operating Results

The plant has operated 24 hours a day over extended periods. To date some 500,000 gal. of 900 seconds viscosity fuel oil have been gasified to produce 135 mill. cu.ft. of gas, at calorific values ranging from 440 to 560 B.Th.U. per cu.ft.

Typical Results

Gas Analysis

Volume of gas made per day, cu. ft.	900,000-950,000
Calorific value of gas, B.Th.U per cu. ft.	450-500
Therms of gas net per gal. of oil ..	1.225-1.255
Therms of heating gas used per therm gas made	.025
Steam used, lb. per 1,000 cu. ft. of gas	55
Steam to oil ratio, by weight during oil admission	0.9
Air used, cu. ft. per gal. of oil ..	700
Mean bed temperature as indicated on the pyrometers	875°C.

Cost of Segas

Owing to the experimental working of the York plant and the deliberate and frequent alteration of working conditions it is not possible to give the cost of Segas. It would appear, however, that the gas would compare favourably in cost with gas produced by other means when considered on a production basis.

REFERENCE

1. Stanier, H., and McKean, J. B. The Production of Town Gas by the Catalytic Gasification of Petroleum Oils. Trans. Inst. Gas Eng., 1950-51, Communication 375 and 1954-55, Communication 457.

Women's Gas Federation

Over 500 delegates to the eleventh branch conference of the Women's Gas Federation held at Caxton Hall, London, on November 15, listened to three papers including one on 'Watson House—Some New Appliances and Developments,' illustrated with slides, and presented by Dr. F. J. Eaton, Deputy Manager of Watson House. Dr. Eaton, who was introduced by Dame Vera Laughton Mathews, spoke of the exhaustive tests to which new gas appliances were subjected at Watson House, stressing the fact that the first essential was to ensure safety, by the attainment of complete combustion. He dealt with cooker tests in some detail, with particular reference to a recent Women's Gas Federation questionnaire on the subject of grills, and passed on to a description of the standards demanded from water heaters, space heaters, washing machines, and various types of coke fires and stoves. Dr. Eaton had some interesting comments to make on recent innovations.

A team from the North Western Gas Board competed on November 17 for the Grand Prior's Trophy of the St. John Ambulance Association. The team consisting of J. A. Clague (captain) R. Woods, N. F. Jones, A. Green and A. E. Young (reserve) was placed eighth out of 13 teams. H.R.H. Duke of Gloucester, who is Grand Prior of the Association, presented the team with medallions.

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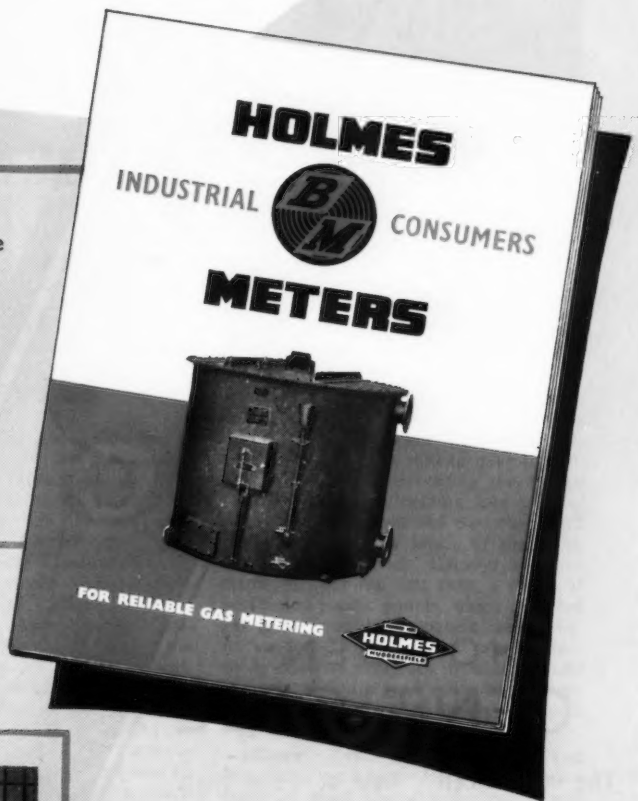

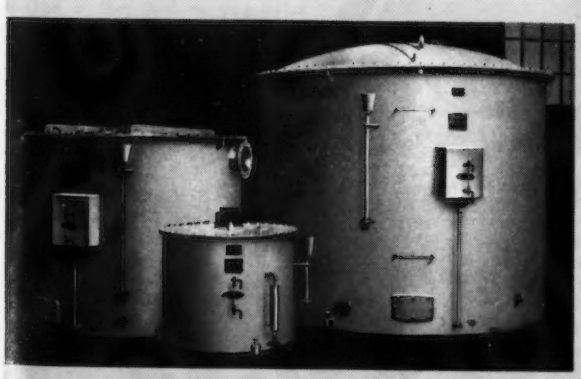

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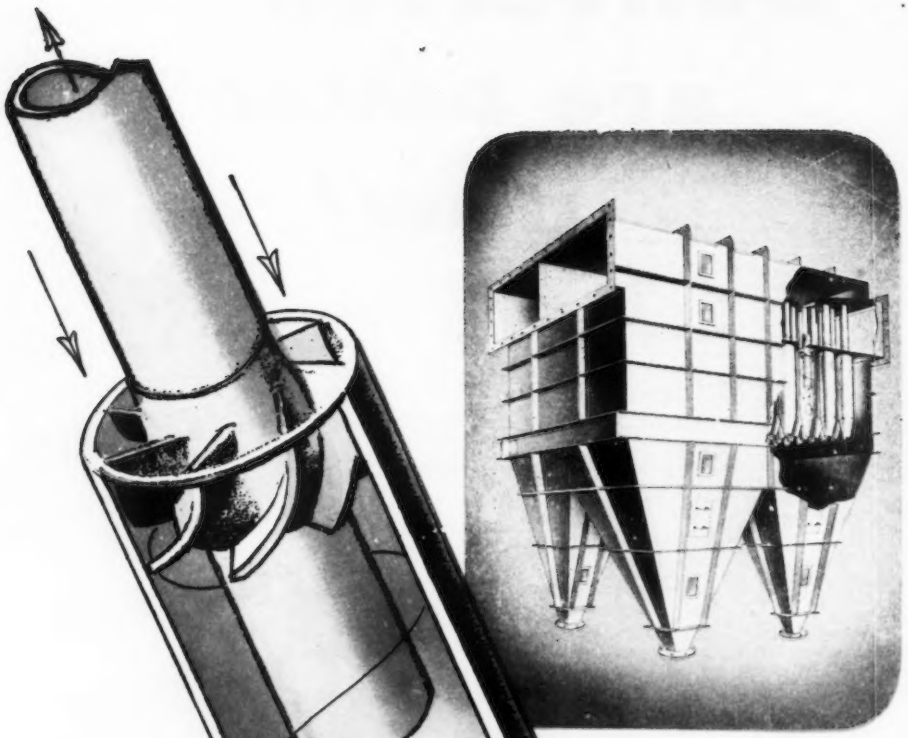

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Building Exhibition 1955

NOVEMBER 16—30

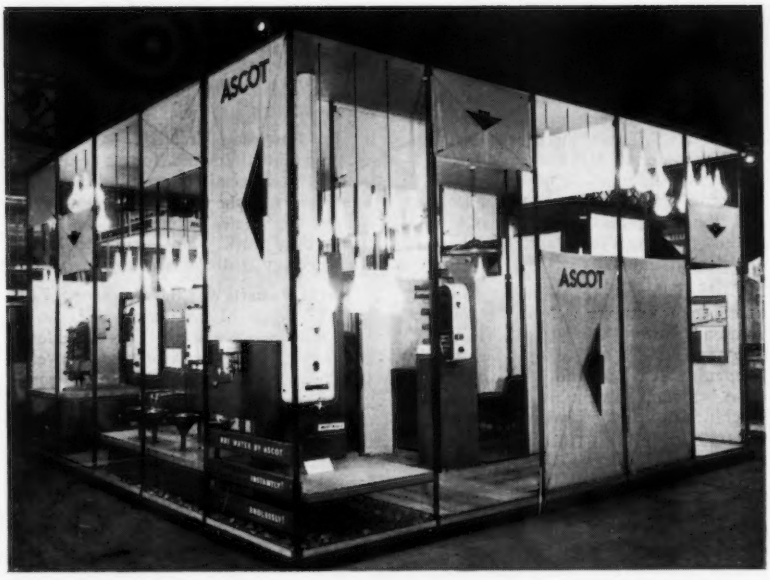
★ ★ ★

THE 1955 Building Exhibition was officially opened at Olympia last Wednesday, November 16, by the Rt. Hon. Nigel Birch, O.B.E., M.P., Minister of Works. He was presented to the gathering of builders, architects, contractors and engineers, by Mr. C. H. Aslin, C.B.E., President of the Royal Institute of British Architects.

In his address the Minister said that the Exhibition, which was held every other year and was the largest exhibition of its kind to be held anywhere in the world, provided a marvellous opportunity for a 'get-together' of all those interested in the industry. He was particularly pleased that so many architects should be showing so much interest in the Exhibition, for if they did not keep themselves in touch with the many developments in building that could be seen there, no progress would take place. He said that the future was represented by the apprentices who were visiting the Exhibition, and foreign interest by a contingent of Russian constructional engineers. More than fifty industries were represented at the Exhibition, and several government organizations had stands. He mentioned particularly the Building Research Station, which was showing some good ideas in connection with smoky chimneys, a subject very much in the public mind at the moment. The whole nation was interested in the building trade, indeed 50% of the nation's fixed investments were in the trade, and £70 mill. of goods and contracts were sold abroad every year. In conclusion the Minister advised everybody to visit every stand at the Exhibition, even if they had to pay twice to come in.

A vote of thanks to the Minister was proposed by Mr. Harvey G. Frost, President of the National Federation of Building Trades Employers, and seconded by Sir Luke Fawcett. In his speech Sir Luke talked of the enormous amount of work that had been done since the war in the rebuilding of Britain's devastated cities. He announced that since the war the phenomenal sum of £1,170,681,000 had been spent on war damage up to October of this year. Claims were still coming in at the rate of £4 mill. a month.

In an interview with a GAS JOURNAL reporter, one of the 15 Russian engineers who were visiting the Exhibition said that all postwar rebuilding in Russia had now been completed. On all new building estates in Moscow and other big cities central heating had been installed. A centrally-situated gas-fired heating station provided hot water to all the houses on each estate. Every kitchen in Moscow and most kitchens throughout the Soviet Union were supplied with gas. Except in some remote areas, all this gas was natural gas. He said that in this respect Russia was similar to America—natural gas was so abundant that there was very little need for carbonization.



A photograph of the Ascot stand taken on the opening day of the Building Exhibition. The stand was designed by Mr. Dennis E. Pugh, A.R.I.B.A.

First on our list is **Ascot Gas Water Heaters, Ltd.**, who, as the result of a stand design competition held last July, probably have the most attractively designed stand at the Exhibition. The designer was Mr. Dennis E. Pugh, A.R.I.B.A., a 27-year-old London architect who had been presented a 200 guinea cheque for his design. He was selected as first-prizewinner from 160 entrants. Of the exhibits displayed by Ascot the most surprising is a Hurdapta (Hurseal, Ltd.) fire. It was explained that customers were being pursuaded to invest in two separate units, a Hurdapta and an Ascot water heater, rather than in a combined back-boiler fire which was said to be a far from economical and a much out-dated installation. Apart from this, Ascot are exhibiting a range of gas water heaters designed to give an instantaneous and constant supply of hot water for both domestic and commercial needs.

Thomas De La Rue & Co., Ltd., have a double stand which is designed to give the utmost technical advice to architects and builders on the methods of application of Formica laminated plastic, and there are four separate sections showing typical installations. One of the quadrants houses a modern kitchen unit with horizontal and vertical surfaces veneered with Formica and a De La Rue 'Warwick' coloured cooker to match the overall colour scheme.

Sydney Flavel & Co., Ltd., are exhibiting a wide range of products consisting mainly of solid fuel and space heating appliances. These include the Newbold and Flavel Seymour solid fuel grates, two boiler sets, the Camberwell and Panel gas-fires, a clothes drier, the new Flavel Cotswold solid fuel cooker, and two instantaneous gas water heaters which are being shown for the first time at this exhibition.

G. A. Harvey & Co. (London), Ltd., are showing their new type of manhole and cover in their hot water cylinders. This development is said to have the advantage that, by preventing the thread of the bolts from coming into contact with water, corrosion and the consequent risk of shearing the heads of the bolts, has been eliminated. Harveys are also displaying, for the first time, a range of perforated plastic panels, which are used for grilles, ventilating panels, and radiator covers. 'Harco' gilled tubes, extensively used as radiators in factories and for central heating of office blocks, are displayed in various diameters and pitch of gills.

Hilmor, Ltd., are exhibiting and demonstrating a large and comprehensive range of hand operated, hydraulic, and motorized tube bending machinery to cover the requirements of heating engineers and gas fitters. Among machines to be shown for the first time at the exhibition is the Three Point Bender No. 4, which is a lightweight machine actuated by a screw-type ram to bend up to 1 in. bore gas and steam pipes. This machine, together with Rotary Hydraulic benders and hand and power operated short radius Mandrel machines, is being demonstrated daily.

Hurseal, Ltd., with **Gulf Radiators, Ltd.**, and **Sealdraught, Ltd.**, are exhibiting a comprehensive range of oil-filled safety radiators for electric, gas, and paraffin operation. Sealdraught products on show are:—Auto-Seal Automatic Draught Excluder; Stick-a-Seal, a self-adhesive, rot-proof, plastic foam weatherstrip, which is new to Britain; Sun-Seal, a flexible, featherweight vene-

tian blind. Also exhibited by Hurseal, Ltd., are the Hurdapta fire and an Ascot instantaneous water heater.

Fibreglass, Ltd., show thermal and sound insulating materials supplied for the structural insulation of houses, factories, *etc.* These include a bitumen-bonded material for use in walls, ceilings, and floors. The insulation of domestic attics against cold and heat, and the protection of tanks and pipes against frost by Fibreglass rigid sections, are demonstrated.

C. H. Johnson (Machinery) Ltd., are exhibiting portable conveyors, which combine a short wheel-base with a large overhang, and are said to be extremely manœuvrable; and the Hyloveyor and 'MA' models which are high capacity machines (up to 3 cu. yd.) with hydraulic jacking to give large-range discharge heights.

Mackay of Feltham are displaying the Allis-Chalmers Tracto-Shovel, model HD.5G, together with three of its 16 equipments, the standard 1¼ cu. yd. bucket, the trenchhoe, and the hydraulic ripper. The Merton Overloader, which is said to have achieved a reputation as the fastest and most robust wheeled loading shovel, is also exhibited.

The Marley Tile Co., Ltd., exhibits include Marleythene tube, which is a new lightweight polythene thermoplastic pipe for use in the distribution of cold water, gases, compressed air, and a wide range of chemical products.

Radiation Group Sales Ltd., are publicly demonstrating for the first time the Heatmaster, which is said to be one of the most important postwar developments in domestic heating and cooking. It provides heat for cooking, hot water, and house heating, under automatic control from one unit. It is the first cooking appliance to burn coke or coal to provide thermostatic control over a full range of oven temperatures. Also on show was the Parkray 3 smoke-consuming convector fire, and some gas water heaters.

The **Rawlplug Co., Ltd.,** are demonstrating their devices for every fixing job. Of special interest are demonstrations of the uses of Rawlbolts, which are metal expansion bolts for heavy duty work. Durium tipped drills, for masonry drilling, are also exhibited.

David Roberts & Co. (Engineers), Ltd., show a range of equipment for use in industrial construction. This includes a number of Wacker vibrators, powered by petrol engines, for use on sand, gravel, earth, clay, loam, and concrete; the Rotor-Loader, a mechanical continuous loader, which when used with the 'Featherweight Articulating Conveyor' forms a unit with which one man can load, transport, elevate, and deposit, large volumes of material; also the Robel unit scaffolding system, shown at this exhibition for the first time, with which angle-section ledgers can safely be used.

William Sugg & Co., Ltd., exhibit on the **Gas Council** stand the 'Halcyon' space heater, which consists of a gas burner, a heat exchanger, and a silent electric fan combined together in one compact housing. The heater can be used in factories, offices, canteens, and in the home. Air duct components can be supplied for distributing warmed air through buildings. The theme of the Gas Council's stand is the nation-wide use of gas and coke in modern housing development, in auxiliary social services, and in commercial welfare schemes. It indicates the new developments of gas and coke in these fields and how they are contributing materially to the comfort and well-being of the whole community.

Tubewrights, Ltd., are demonstrating the design and fabrication of welded tubular steel structures. Models on display include an 'Arcon' saw tooth roof, a 'Unimer' storage building, and tubular steel foot and pipe bridges, overhead cranes and jibs.

F. E. Weatherill, Ltd., are showing two of their most recently introduced machines in the 'Weatherill Hydraulic' range. These are the 4HTW 2-Way Overloader, capable of discharging its load either at the rear or in front, and the 2HCR Front End Loading Shovel, exhibited for the first time, which includes a scoop-crowd action, and is said to be stronger in construction and faster in operation than any previous model.

Warsop Power Tools, Ltd., are exhibiting their S.7 concrete breaker, H.D. rock drill, 'Benjo' rammer, and a range of Warsop pumps to which has been added a new 3 in. diesel pump claimed to have a free flow output of 14,500 gal. per hour, and a total head of 115 ft.

The general theme of the **Solid Smokeless Fuels Federation's** stand is the adequate storage of solid fuel, the only domestic fuel, they claim, that can be stored in the home, to enable householders to build up a reserve of fuel to meet cold spells.

The **Yorkshire Copper Works, Ltd.,** are exhibiting a wide range of tubes for domestic hot and cold water, gas, waste, heating, and sanitation services. Apart from the copper and chromium-plated tubes, a notable feature is the 'Polyore A' polythene tubing for domestic and industrial cold water services in buildings, caravans, waste systems, and underground pipelines. The 'Plastronga' fittings for use with polythene tubing are also on show.

NEWS IN BRIEF

The London County Council development scheme at Picton Street, Camberwell, provides for both 11-storey and 4-storey maisonette blocks. Individual gas-heated drying cabinets are being provided within each flat of the 11-storey block, together with a mechanical extract ventilation. Also in these blocks will be gas ignited Caledo stoves. In the 4-storey blocks, gas points are being provided for cookers, refrigerators and open grates.

An explosion which occurred at the works of Loughborough Glass Co., Ltd., Loughborough, Leicestershire, while a new gas meter was being installed, resulted in structural damage to the room containing the meter and windows in the company's canteen adjoining were blown out. A Gas Board employee sustained minor cuts.

R. Russell and Sons (makers of gas cookers) has decided to close its Derby works and transfer production elsewhere —owing to shortage of labour. A director of the company, Mr. Russell, said the decision to transfer production had been taken with the 'greatest reluctance' and only because of the shortage of labour which had had a serious effect on output for several years.

Mr. Harold S. Hughes, technical coke development officer, Scottish Gas Board, told a conference at Perth on November 8 sponsored by the Women's Advisory Council on Solid Fuel that the bulk of solid smokeless fuel for the future will be gas coke, supplemented to a growing extent by the hard cokes. A considerable amount of research was going on to evolve a domestic open fire which would burn house coal with the minimum of smoke.

At the annual dinner of the bowls section of the Oxford Gas Social and Sports Club, the chairman of the club, Mr. S. C. Bentley, who is also Engineer and General Manager of the Oxford and District Group of the Northern Division, Southern Gas Board, presented the awards and congratulated the winners. He also presented to Mrs. M. Webb, a clock, the gift of the management and staff, and to Mr. C. G. Longford a cheque on behalf of the Sports and Social Club, to mark their retirements. The bowls winners were: singles, V. G. Crumley, runner-up, F. F. Vivian; pairs handicap, M. L. King and P. Canning, runners-up, A. C. Tombs and F. Gerrard; singles handicap, J. R. Knapp, runner-up, F. R. Chivers.

Last week, in an article on p. 473 describing a gas exhibition at Westminster Technical College, we inadvertently stated that all the models were supplied by the North Thames Gas Board. In point of fact, the panel of the cut-away models shown in the left hand illustration was sectioned and supplied by Benham & Sons, Ltd., 66, Wigmore Street, London, W.1, and not by the North Thames Gas Board.

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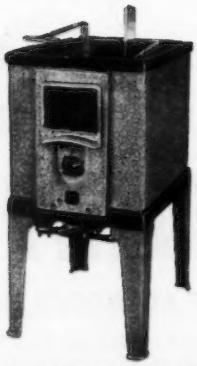

GG 222 Griller
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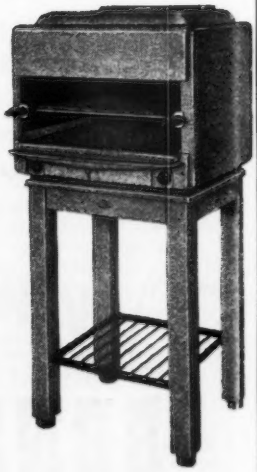

GF 91/R Fat Fryer
This deep fat fryer is fitted with automatic fat or oil temperature control. Cold zone and crumb well to pan. Available with or without chip box over pan.

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GAS COUNCIL'S NEW LABORATORIES AT FULHAM

Last Friday, Sir Robert Robinson, O.M., pressed a button at the Gas Council's London Research Station, Fulham—a massive roller shutter rose and the important new laboratory extensions were officially open. The extensions add another three laboratories to the Station and just about double the floor area available. Research workers at Fulham are concerned with investigations into the production and purification of fuel gases. In the past few years they have devoted more and more time to chemical engineering and pilot plant experiments. After the opening there was a luncheon at the Dorchester for the visitors at which Sir Robert Robinson and Sir Harold Smith were the principal speakers.

Right: After the opening of the new research building. Left to right: Sir Harold Smith, Chairman of the Gas Council; Mr. Michael Milne-Watson, Chairman of the North Thames Gas Board; Sir Robert Robinson, O.M.; Dr. R. H. Griffith, Director of Research at the Gas Council's London Research Station; Mr. H. F. H. Jones, Deputy Chairman of the Gas Council.

The 'GasMiser' to Start Revolution?

A new Cannon convector heater which is claimed to make possible continuous room heating at a cost lower than coal was demonstrated to an audience from the technical Press and elsewhere at the Empress Club, London, on November 18.

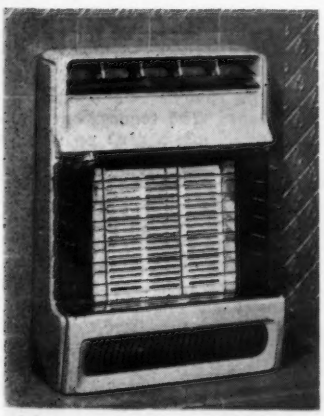
Mr. A. F. Oatley, Managing Director of Cannon (GA), Ltd., was enthusiastic enough to consider that the 'GasMiser' was, perhaps, the beginning of a revolution in space heating. 'We are not interested in the results we get from the test bench. All we care about are the results we get from the home.'

He presented a bouquet to one guest of honour—the 'Bride of the Year,' Mrs. Audrey Marland, who was accompanied by her husband. Also among the guests were Mr. Philip Harben, television's cookery expert, and personalities from the gas industry's publicity fields.

The 'GasMiser' has an appearance that would blend well with most domestic surroundings. At the same time its design is said to be the secret of its efficiency. Heat loss, caused by cold air passing through the flue and up the chimney, is eliminated by the inner main hot air jets being entirely enclosed and insulated by the secondary convector outer jets. This feature is called the 'Multyjet.'

Probably, the heater's greatest attraction is its precisely controlled range of specific heats: 'Super heat,' 'Normal,' and 'Miser rate,' which descriptions speak for themselves. The gas rates are: 'Super heat,' 36 cu.ft. per hour; 'Normal,' 22 cu.ft. per hour; 'Miser' 12 cu.ft. per hour.

Its dimensions are: Height, 2 ft. ½ in.; width, 1 ft. 6½ in.; depth, 7 in.; flue opening $11\frac{13}{32}$ in.; maximum height of flue, $19\frac{7}{16}$ in.



The Cannon 'Gas Miser' room heater, incorporating the new 'multyjet' hot air convector.

'MRS. AMERICA' VISITS NORTH WEST

In a competition similar to the Gas Council's 'Bride of the Year,' Mrs. R. Deitemeyer, pictured here (left), of Lincoln, Nebraska, has been chosen by the American gas industry as the 'most representative American housewife.' One of her prizes was a 38-day European holiday and last week she spent two days of it in Manchester. On November 17 she met Mrs. Audrey Marland, the Gas Council's 'Bride of the Year,' when in the demonstration theatre of the North Western Gas Board, they exchanged typical Lancashire and American dishes.

GAS CONSULTATIVE COUNCILS

Weston-super-Mare/Taunton Tariff Appeal

A meeting of the Weston-super-Mare/Taunton Local Committee of the South Western Gas Consultative Council was held at Bridgwater on October 26. Councillor H. Morland (Glastonbury), the chairman, presided.

Concern at Interest Rates

The Committee were told that the Consultative Council at their last meeting had felt concern at the general raising of the rates of interest charged on loans including those used for the development of the gas industry. In the Council's view the increases were adverse in their effects so far as gas consumers were concerned and there had been no discrimination in their incidence between luxury trades and upon public utility services and the essential industries of the nation. A resolution to this effect had been sent by the Consultative Council to the Chancellor of the Exchequer.

Arising from the concern felt by the Consultative Council as to the availability of supplies of coke during the winter months, Mr. Jackson told the Committee that in his Division the stocks in hand were not as great as those of last year because of the interruption of the supply of coal to gasworks resulting from the railway strike. They were adequate, however, to meet present demands and deliveries were up to date. If a prolonged spell of severe weather came along the coke supply position might become difficult as through insufficiency of coal, the Board had only been able to build up throughout the Area coke stocks that were two-thirds of their target figure.

To offset the effects of coal shortages, Mr. Jackson said, the Board were developing the making of gas by alternative techniques, the effects of which would be to release for sale a higher proportion of the coke that was made. The full results would not be felt for some time and coke users should in their own interests stock up, if possible, while coke was adequately and quickly available.

Tariffs

The recently revised gas tariffs were discussed by the Committee with particular reference to the prices charged in Somerset. Councillor H. Morland (Glastonbury) questioned, in view of the present methods of gasmaking and distribution and the closing down of the uneconomic production centres, whether there was justification for as many as five different gas price levels in Somerset. Mr. Jackson said that in fixing their price zones the Gas Board had taken into account the additional costs that were involved in pumping gas from the centres of production to the sometimes distant places where it was used. The price position in Somerset had been closely examined by the Board and changes in the price zones had been incorporated in the recently published gas tariffs. Mrs. N. J. Greenhill (Cheddar) said that although the Gas Board had only recently taken a decision about Somerset prices, she thought the position should be looked into without delay so that if any representations were decided upon by the Consultative Council they could be made before the Gas Board reached any conclusions about alterations to the existing tariffs. Councillor J. D. Duncan (Wells) and Councillor E. J. Hardwidge (Shepton Mallet) supported her view and moved the following resolution:—

'That the Consultative Council be asked to consider the question of the gas tariffs with a view to seeking a greater measure of uniformity of gas prices in the County of Somerset'. The resolution was carried.

Councillor G. Lee (Bishops Lydeard) said his local Parish Council had recently protested to the Gas Board against the discontinuance of facilities for using pennies in slot meters. He was concerned because the Gas Board had acted without notice to the people concerned or discussion with the consumers' local representative body. In rural districts, Councillor Lee said, the shillings required for meter use were not always easy to obtain.

Mr. Jackson said the Gas Board's policy for some time had been not to instal meters that accepted pennies only. There were in the district, however, a number of meters that took both pennies and shillings. For various reasons associated with changing values, the use of pennies in meters was technically and economically undesirable and the Board were installing dual coin meters usually taking sixpences and shillings but meters accepting florins could also be provided.

Councillor A. A. Venn (Minehead) thought a deprivation of meters accepting pennies could inflict hardship on such people as old age pensioners when towards the end of a week their means were becoming exhausted. Mr. Jackson assured the Committee that any cases of particular difficulty with regard to meter facilities would receive sympathetic consideration.

New Showroom

At a meeting of the South Eastern Gas Consultative Council held on November 1, it was reported that a new showroom would be opened at 169/171 Northdown Road, Cliftonville. At the same time the existing showrooms at Dane Road and Westbrook, Margate, would be closed to the public. It was also reported that the public counter at the divisional office, in Fairfield Street, Wandsworth, would be closed.

The meeting noted the resignation of Mrs. C. M. Rover, a Member of the Kent Suburban District Committee. It was agreed that Mrs. H. Whittick of Beckenham, who was a nominee of the National Women Citizens' Association, be appointed in her stead.

It was noted that further mainlaying involving 325 dwellings was proposed by the Gas Board.

Combustion Engineers' Annual Conference

The Annual Conference of the Combustion Engineering Association will be held at the Palace Hotel, Buxton, on December 8 and 9, 1955. The title of the Conference is 'The Years Between,' and it is the intention to examine and discuss the fuel and power problems which will be encountered by industry in the years before the full introduction of nuclear power. Attendance at the Conference will not be confined to Members of the Association, but is open to anyone interested in the subjects to be discussed. Among the short addresses to be presented at the first session is one by Mr. W. Hodkinson, O.B.E., Chief Technical and Planning Officer, North Western Gas Board.

Britain's Energy Prospects

The 1955 Viscount Nuffield Paper of the Institution of Production Engineers will be on 'Britain's Energy Prospects.' The paper will be presented by Dr. G. H. Daniel (Chief Statistician of the Ministry of Fuel and Power) at the Royal Institution, Albemarle Street, London, W.1, on December 15, 1955, at 6.30 p.m. Tea will be served from 5.30 p.m. Forms of application for tickets of admission to the meeting and preprints of the paper may be obtained from the Secretary of the Institution of Gas Engineers, 17, Grosvenor Crescent, London, S.W.1.

Meter Illusion

A theatre programme notice has been intriguing Scottish playgoers as the new Fay Compton play 'Tabitha' has been going the round of the cities. Among the customary programme credits for scenery, cigarettes, and sound effects appears the line—'Gas meters kindly lent by North Thames Gas Board, London.' Actually, there is only one meter, but it must be one of the most far-travelled meters in existence. When the general manager of the touring company was assembling the props for the tour, he knew he had to have a gas meter but he found that it was something that he could not buy. It was obviously impossible for him to try to borrow a meter at each of the twelve cities the play was visiting, so he asked the North Thames Gas Board for the loan of one. The request was granted. The meter is just a prop on stage, and does not work. The audiences, however, think it does when they see a gas fire light up. All is illusion. The 'gas' fire supposedly fed through the gas meter is really operated by electricity.

To meet an increasing demand for their products the Sheffield office of Honeywell-Brown Limited, has now moved from Oak Dale Road to larger premises at 119, Petre Street, Sheffield 4. Under the management of Mr. W. R. Owen the new office will provide improved sales and service facilities in the Sheffield area.

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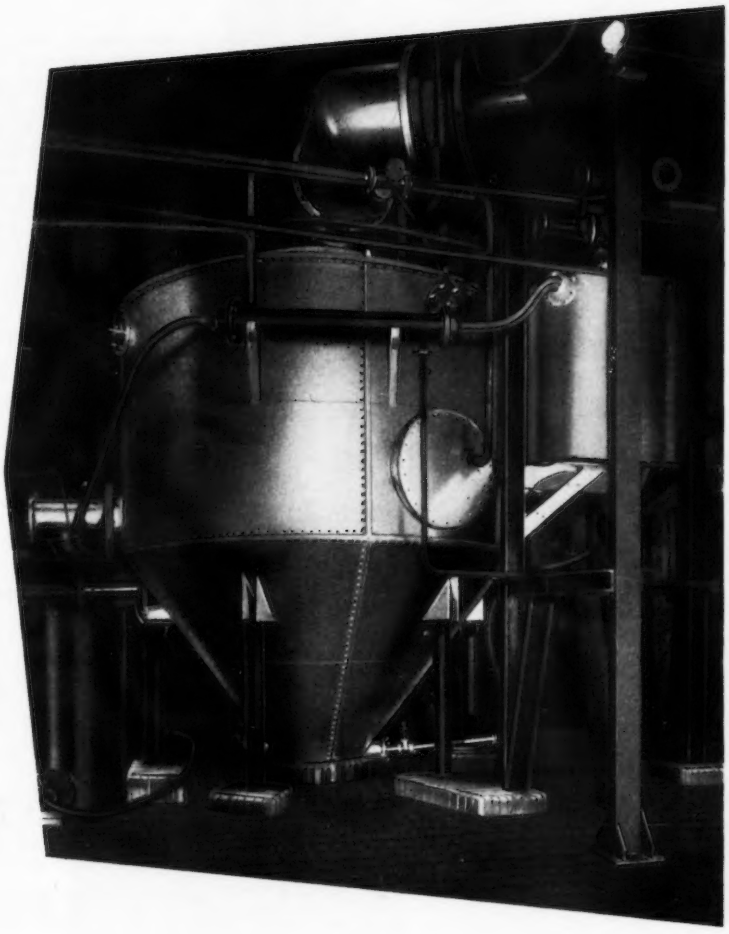

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The long-standing co-operation between the gas industry and the National Benzole Company, dating from the Company's inauguration at a meeting in the offices of the then Gas Light and Coke Co., is exemplified again in a special window display which will be seen in Gas Board showrooms in most parts of the country during the coming weeks. The display features Mr. Therm and Mr. Mercury drawing attention to the British coal from which is derived gas for the home and for industry, and benzole for blending with high grade petrol to produce National Benzole Mixture.

Exhibition and Demonstration at Stirling

Provost D. W. Duncan had high praise for the Alloa-Stirling sub-group of the Scottish Gas Board for their enterprise in bringing together an exhibition of modern gas-cooking and heating utensils along with cooking demonstrations at the Golden Lion Hotel, Stirling, recently. Mr. W. M. Gledhill, sub-group manager, said that the occasion would bring to notice the latest developments in gas cookers and other equipment—and one item was on show for the first time in Scotland. He stressed that modern gas appliances gave greater economy in operation, and, by comparison with old cookers, saved one therm in five.

Referring to the projected Clean Air Bill, Mr. Gledhill stressed that the gas industry was going all out to help in the bid for purer air by producing more smokeless fuel. The latest development was the smokeless fuel fire with a small gas fire in front of it, which could be used in the summer when the fuel fire was not wanted. He paid tribute to his sales staff for the great amount of work they had put in to ensure the success of the event. The demonstration was arranged under the auspices of the Universal Cookery & Food Association (Scottish Division) and Mr. A. J. Abrahamson, chef de cuisine at the Station Hotel, Stirling.

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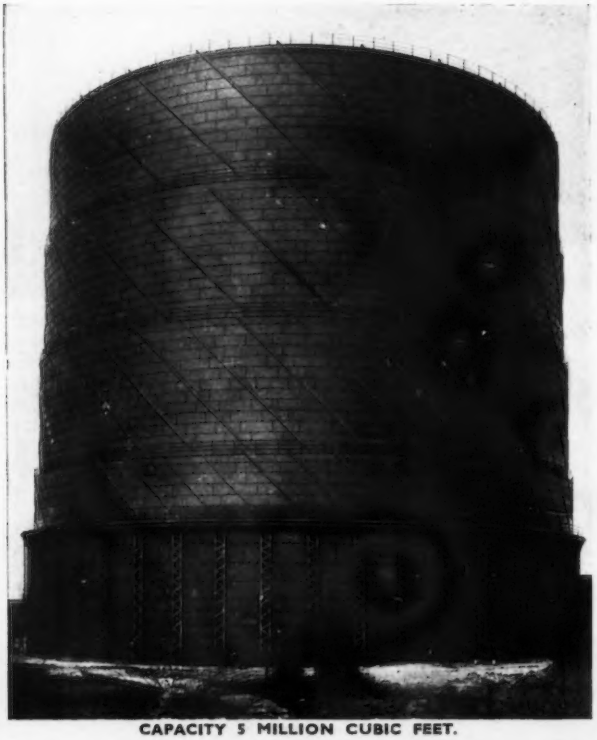

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Coal Position Reviewed

Speaking on the national coal economy campaign at a meeting of the Regional Board for Industry in Birmingham on November 15, Mr. Geoffrey Lloyd, Minister of Fuel and Power, said that the latest figures showed that coal stocks at 193 mill. tons were still rising and that output from the mines, for the second week in succession, was higher than a year ago despite the decline in manpower. However gratifying that might be, the real testing time had yet to come, and there were no grounds at all for the relaxation of effort in any direction.

Coal Substitution

Mr. Lloyd likened the coal position as the battle which was being fought along four fronts. There was the battle for higher coal production; the battle for greater economy in the industrial use of coal; the battle to save coal by increasingly substituting oil; and fourthly, there was the less publicized battle to achieve overall solvency in the coal budgets of all European nations.

Mr. Lloyd said that on the *coal substitution front*, the news was distinctly encouraging. The latest figures revealed that this year the industrial consumption of fuel oils was running at a rate of about 20% above 1954. The Central Electricity Authority was forging rapidly ahead with its plans for oil conversion. The Authority planned to have the first unit of the great new Marchwood power station generating electricity from oil by the end of this year. For the country as a whole, the switch to oil should progressively bring savings rising to some 25 mill. tons of coal a year by 1960. He described the efforts in the gas industry to put into operation highly important projects for gasifying surplus oil at refineries, and feeding it into a grid. The first of these projects was at the Kent Oil Refinery, and he had no hesitation in approving the capital expenditure necessary for this work. The industry was pressing on with similar arrangements in other parts of the country, notably at Shellhaven, Coryton, Fawley, and Llandarcy, where other great oil refineries were situated. Mr. Lloyd paid tribute to the enterprise of the gas boards and the oil companies, and to the scientists and technicians who made these developments possible, but he felt there were still a number of large industrial concerns which were heavy consumers of coal and which might, with advantage, examine the possibility of switching to oil. He was sure the managements of these companies were well aware of the urgency of the matter, and the officials of his Ministry were ready to offer all the assistance they could.

European Coal Position

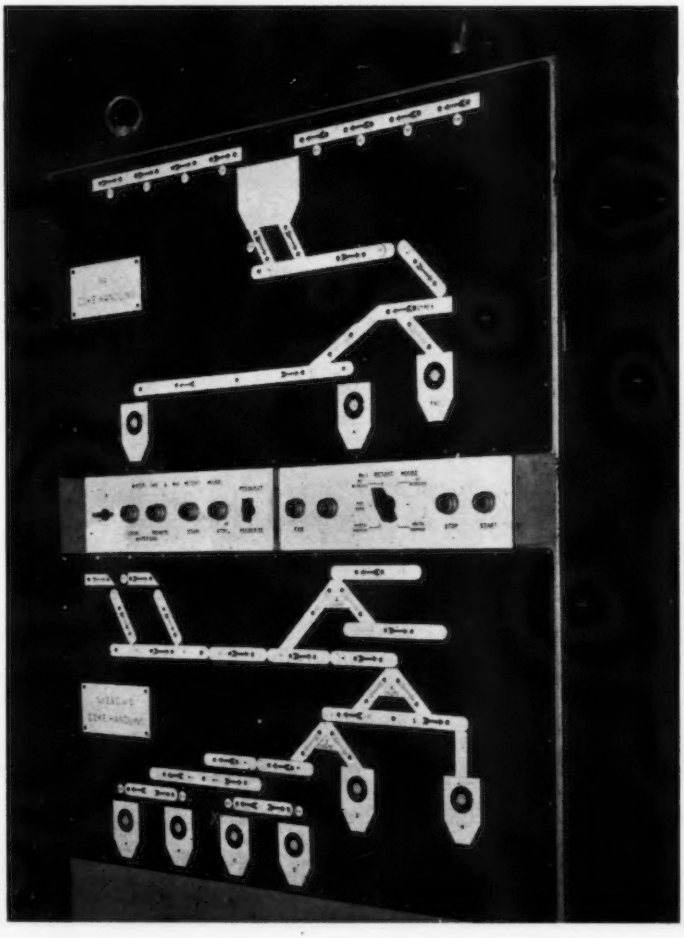
Discussions on the European coal situation took place in Luxembourg on November 17 and 18, at the first meeting of the Council of Association of the European Coal and Steel Community. The Government was represented by the President of the Board of Trade. Among the subjects discussed was the decision by the British Government to withhold further exports of coal after January 1, 1956, a decision which was likely to throw an increased burden on the Community, especially the areas which relied on traditional imports of British coal. Speaking on this subject, at the Regional Board for Industry Meeting, Mr. Lloyd explained that British stocks for this winter had been built up mainly by imports, at a high cost in foreign exchange, about £80 mill., half of which was in dollars, and the decision to curtail exports to Europe was only taken out of extreme necessity.

Young Workers

The Sixth Oxford Conference to be held from April 7 to 13, 1956, will be on 'The Education of the Young Worker'. Organized by Oxford University, Department of Education under the patronage of H.R.H. Duke of Edinburgh, it will be held at Oriel College, Oxford. The conference is to consider the needs of young workers preparing for relatively unskilled occupations. Apart from lectures, commissions will be formed to study such questions as: 'Do they find the right jobs for their capacity and expectations?'; 'What education do they need, for efficiency, for personal growth and for responsibility?' and 'Who should provide this education? And how may it be done?' The inclusive fee is £12, of which 10s. is payable as a registration fee and is not returnable. Applications for attending the conference should be addressed to the Secretary, Young Worker, 15, Norham Gardens, Oxford, before December 31, 1955.

AUTOMATION AT TOTTENHAM

The final stage of the 'push button' installation at the Works of the Eastern Gas Board, at Willoughby Lane, Tottenham, is now completed. The panel, shown here, has illuminated mimic diagrams and is used to control the distribution of coke and breeze from the I.V.C. section screening plant to the I.V.C. producers and breeze pads, the C.V. producers and the C.W.G. plant. The panel was designed and constructed entirely by the Board's own electricians at Willoughby Lane.



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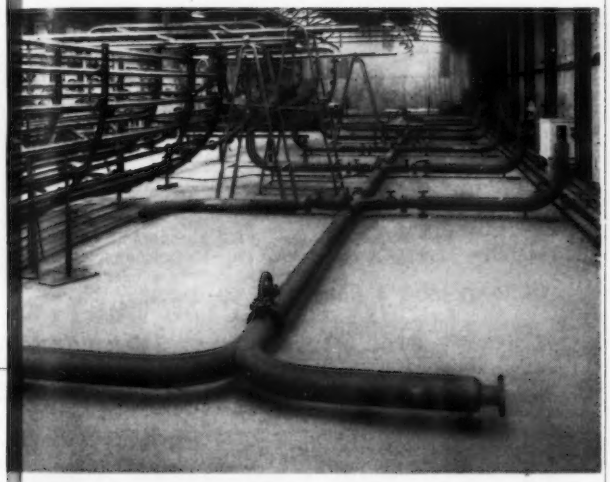

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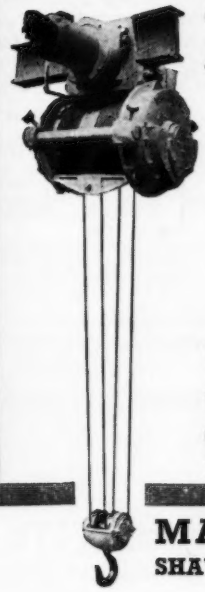

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Subscription Rates: Home and Empire:—**60/-** per annum; Foreign:—**70/-** per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at **2/-** per line (approx. **7** words)—minimum charge **10/-**. A Box Number address occupies **2** lines, and a further **6d.** is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

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WEST MIDLANDS GAS BOARD

SENIOR DRAUGHTSMAN—
INDUSTRIAL DEPARTMENT

APPLICATIONS are invited for the post of SENIOR DRAUGHTSMAN in the Drawing Office, Industrial Department, Brasshouse Passage, Broad Street, Birmingham.

Candidates should possess the Higher National Certificate in Mechanical Engineering, and have had experience in a drawing office engaged on the design of furnaces, stoves or similar equipment.

The salary for the post will be within Grade 9 (£700-£800 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications stating age, experience, positions held and qualifications, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham 15, to reach him not later than December 7, 1955.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

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DIVISIONAL INDUSTRIAL GAS STAFF

APPLICATIONS are invited for the following posts:—

INDUSTRIAL GAS REPRESENTATIVE

Candidates should have experience in industrial and commercial gas utilisation and a knowledge of the comparative costs and merits of other fuels.

Possession of the Institution of Gas Engineers, Higher Grade Certificate in Gas Engineering (Supply) or equivalent qualification would be advantageous.

The salary will be within the range of Grade A.P.T. 8 (£660-£740 per annum) of the National Salary Scales.

TRAINEE

Candidates should have suitable basic training, personality and qualifications and be interested in a career on the industrial side of the Gas Industry.

The person appointed may be expected to follow a course of training.

The salary will be within the range of Grade A.P.T. 4 (£365-£555 per annum) or Grade A.P.T. 5 (£530-£610 per annum) of the National Salary Scales, according to qualifications and experience.

These appointments will be superannuable, and the successful candidates may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. F. Harvey, Divisional General Manager, West Midlands Gas Board, Walsall and District Division, Walsall Factory Estate, Tame Bridge, West Bromwich Road, Walsall, to reach him not later than December 7, 1955.

J. C. INGRAM,
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WEST MIDLANDS GAS BOARD

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J. C. INGRAM,
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J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

DRAUGHTSMAN
INDUSTRIAL DEPARTMENT

APPLICATIONS are invited for the post of DRAUGHTSMAN in the Drawing Office, Industrial Department, Brasshouse Passage, Broad Street, Birmingham. There are two vacancies.

Candidates should possess as a minimum qualification the Ordinary Grade National Certificate in Mechanical Engineering, and also have at least three years' Drawing Office experience, preferably on furnaces, ovens or similar work.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

The salary for the post will be within Grade 7 (£620-£700 per annum) of the National Salary Scales for Gas Staffs.

Applications stating age, experience, positions held and qualifications, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham 15, to reach him not later than December 7, 1955.

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Secretary to the Board.

Classified advertisements continued on page 546

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Carmarthen.

WALES GAS BOARD

PORT TALBOT UNDERTAKING
MECHANICAL SUPERINTENDENT

APPLICATIONS are invited for the above appointment.

Candidates must have served five years with a firm of Mechanical Engineers, and must be experienced in the repair and maintenance of oil engines, rotary and reciprocating compressors, all types of pumps, and other ancillary mechanical plant. It would also be an advantage if the applicant had experience of carburetted water gas plant and some knowledge of electrical equipment.

Housing accommodation will be available on the Board's terms of rental.

The salary will be within Grade A.P.T. 8 of the National Joint Council for Gas Staffs—£660/£740.

The successful applicant may be required to pass a medical examination and to subscribe to the Board's Superannuation Scheme.

Applications stating details of technical education and experience, and giving the names of two referees, must be received by the undersigned not later than 14 days after the appearance of this advertisement.

W. F. EDWARDS,
General Manager and Secretary.

18, Station Road,
Port Talbot, Glam.

NORTHERN GAS BOARD

(TYNESIDE DIVISION)
TECHNICAL ASSISTANT (PURIFICATION)—REDHEUGH WORKS

APPLICATIONS are invited from suitably qualified persons for the above position.

Applicants should have had a wide experience of modern gas purification practice and will be responsible to the Works Manager for the control of all wet and dry purification plant.

The appointment will be within Grade APT. 10 (£760-£860 per annum) of the National Salary Scales for Gas Staffs.

The successful applicant will be required to pass a medical examination and be subject to the Board's Pension Scheme.

Applications stating age, experience, qualifications, and giving the names of two referees, should be addressed to the undersigned within fourteen days of this advertisement.

W. SUTCLIFFE,
Divisional General Manager.

30, Grainger Street,
Newcastle-upon-Tyne, 1.

NORTHERN GAS BOARD

DARLINGTON DIVISION

APPLICATIONS are invited for the following positions:

(a) DIVISIONAL CHIEF CHEMIST

Candidates should be qualified to undertake full responsibility, under the Works Manager, for supervision of chemical staff, for all chemical testing, control of Glover West Vertical Retort Installation, modern C.W.G. Plants and ancillary equipment. Corporate Membership of the Institution of Gas Engineers or equivalent qualification will be an advantage.

The salary will be within Grade APT. 9 Provincial "A" (£700-£800 per annum) of the National Salary Scales, initial placing according to experience and qualifications.

(b) SHIFT ENGINEER

Candidates must have had experience in the control and operation of a Glover West Vertical Retort installation, modern C.W.G. Plants and ancillary equipment.

The salary will be within Grade APT. 6 Provincial "A" (£565-£645 per annum).

Successful candidates will be required to pass a medical examination and be subject to the Board's Pension Scheme.

Applications, stating age, experience, qualifications and the names of two persons to whom reference can be made should be addressed to the undersigned not later than December 10, 1955.

F. WILSON,
Divisional General Manager.

Gas Office,
John Street,
Darlington.

DEVELOPMENT Chemist required for Manchester Area. State qualifications, experience, age and salary required. Apply: No. 266, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

ASSISTANT, technical, required for development work on controls for the Gas Industry.

Preference for man 20-24, National Service completed and studying for degree in physics or engineering or H.N.C. Interesting work in a progressive Company.

Apply with full particulars to:—Technical Manager, Engineering Division, Evered & Co., Ltd., Surrey Works, Smethwick 40.

NATIONAL COAL BOARD

DURHAM DIVISION
DIVISIONAL CARBONISATION ENGINEER

APPLICATIONS are invited for the above position.

Applicants should hold a recognised qualification in Engineering and preferably have had experience of the installation and maintenance of carbonisation plant. Salary according to qualifications and experience on a range with a maximum of £2,000. Those who applied in response to the previous advertisement need not re-apply. Applications to be submitted within 14 days of advertisement to, Divisional Establishments Officer, National Coal Board, Durham Division, 'D' Floor, Milburn House, Newcastle-on-Tyne, 1.

SCOTTISH GAS BOARD

GLASGOW DIVISION
(GLASGOW DISTRICT)
CHIEF ASSISTANT—INDUSTRIAL SALES

APPLICATIONS are invited for the position of CHIEF ASSISTANT—Industrial Sales to the Glasgow District.

Candidates should have experience in Industrial and Commercial Gas applications and a knowledge of competitive fuels.

Applicants should possess the Higher Grade Certificate of the Institution of Gas Engineers (Supply) or its equivalent.

The salary will be within Grade 10 (£760 to £860 per annum) of the National Salary Scales for Gas Staffs. The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, training and experience, together with the names of two referees should be addressed to the undersigned to reach him not later than December 7, 1955.

D. F. YOUNG,
Divisional Controller.

9, George Square,
Glasgow, C.2.

SCOTTISH GAS BOARD

EDINBURGH DIVISION

APPLICATIONS are invited for the post of TECHNICAL ASSISTANT (Distribution).

Applicants should be capable of assisting the Distribution Engineer in the design, installation and operation of all distributing plant. Experience in practical mainlaying and handling labour would be an advantage, and the successful applicant will be required to carry out the supervision of all types of distribution work.

Applicants should preferably hold a recognised professional engineering qualification of Higher National standard.

Salary will be within A.P.T. Grades 6 to 9 (£565-£800 per annum) depending on experience and qualifications.

Applications stating age, qualifications and details of experience together with the names of two referees should be addressed to the undersigned to arrive not later than two weeks after the publication of this advertisement.

DAVID BEAVIS,
Divisional Controller,
Edinburgh Division.

Scottish Gas Board,
15, Calton Hill,
Edinburgh, 1.

SCOTTISH GAS BOARD

ALLOA/STIRLING SUB-GROUP
SENIOR TECHNICAL ASSISTANTS

(a) Stirling Gas Works

(b) Alloa Gas Works

APPLICATIONS are invited from qualified persons for the above two appointments. Candidates should be experienced in the operation of continuous vertical retorts and ancillary plant.

The salary will be within Provincial "A" Grade A.P.T. 6 (£565-£645 per annum), and housing accommodation will be available on the Board's terms of rental. The posts are superannuable and the successful candidates may require to pass a medical examination.

Applications stating age, education, training, qualifications and experience, should be sent to reach the undersigned not later than Wednesday, December 7, 1955.

W. M. GLEDHILL,
Sub-Group Manager.

Thistle Street,
Stirling.

EAST MIDLANDS GAS BOARD

SHEFFIELD AND ROTHERHAM DIVISION
APPOINTMENT OF ASSISTANT TO THE DIVISIONAL ENGINEER

APPLICATIONS are invited for the above appointment from candidates with an engineering background and experience in Gas Works practice. A Degree in Engineering and/or Corporate Membership of the Institution of Mechanical or Gas Engineers is an essential qualification.

The salary for the post will be within the range of A.P.T. 10/12 of the National Salary Scales (£760-£960) and the initial placing will be dependent upon the qualifications and experience of the successful candidate.

The post is pensionable and the successful applicant will be required to pass a medical examination.

Applications giving details of age, education, qualifications and training together with the names and address of two referees should be addressed to reach the undersigned not later than December 17, 1955.

C. C. WOOD,
Divisional General Manager.

Commercial Street,
Sheffield.

November 21, 1955.

DOMESTIC UTILISATION OF GAS
SMITH & LE FEVRE
20/- *inc. postage*
WALTER KING, LTD.
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E.C.4.

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FOR SALE: NEW GAS-FIRED BOILER by Hartley & Sugden. 160 lbs./hour at 80 lbs. p.s.i. complete with chimney, spare burner and controls. Original purchase price was £419. Our price £200. W. H. COLLINGBOURNE & CO., LTD., 1481 Stratford Road, Birmingham, 28. Phone: Shirley 3303.

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140	Bruce Peebles	Screen Prot.	730
50	L.D.C.	Drip Proof	1440
50	McFarlane	Screen Prot.	750
40	Metro-Vick	Ventilated	975
40	Laurence Scott	Totally Enc.	940
35	Brooks	Totally Enc.	1500
30	Metro-Vick	Screen Prot.	1450
30	G.E.C.	Screen Prot.	720
28	L.D.C.	Screen Prot.	720
28/14	L.D.C.	Screen Prot.	720/360
25	Laurence Scott	Totally Enc.	960
25	Sturtevant	Totally Enc.	1440
22	L.D.C.	Screen Prot.	720
22/11	L.D.C.	Screen Prot.	720/360
20	L.D.C.	Screen Prot.	1460
20	L.D.C.	Screen Prot.	1450
20	Wright	Screen Prot.	1440
20	L.D.C.	Screen Prot.	1440
20	Brooks	Screen Prot.	750
19	E.E.C.	Totally Enc.	1460
18	Brooks	Totally Enc.	1430
15	Brooks	Totally Enc.	955
15	E.E.C.	Screen Prot.	725/900
12	Crompton Parkinson	Screen Prot.	725
10	Brooks	Totally Enc.	960
10	G.E.C.	Screen Prot.	720
10	E.E.C.	Screen Prot.	715
10	Crompton Parkinson	Screen Prot.	580
10	E.E.C.	Screen Prot.	570/720
8	Brooks	Screen Prot.	1500
8	Westinghouse	Screen Prot.	1450
7.5	Crompton Parkinson	Totally Enc.	720
7	E.C.C.	Screen Prot.	470
5	Metro-Vick	Totally Enc.	2920
5	Stamford	Ventilated	1450
5	Brooks	Totally Enc.	1440
5	Metro-Vick	Screen Prot.	1430
5	E.E.C.	Totally Enc.	940
5	B.T.H.	Totally Enc.	725
4.5	Metro-Vick	F.L.P.	976
4	E.E.C.	Screen Prot.	1450
3.5	E.C.C.	Totally Enc.	715
3	Brooks	Totally Enc.	3000
3	Laurence Scott	Screen Prot.	2900

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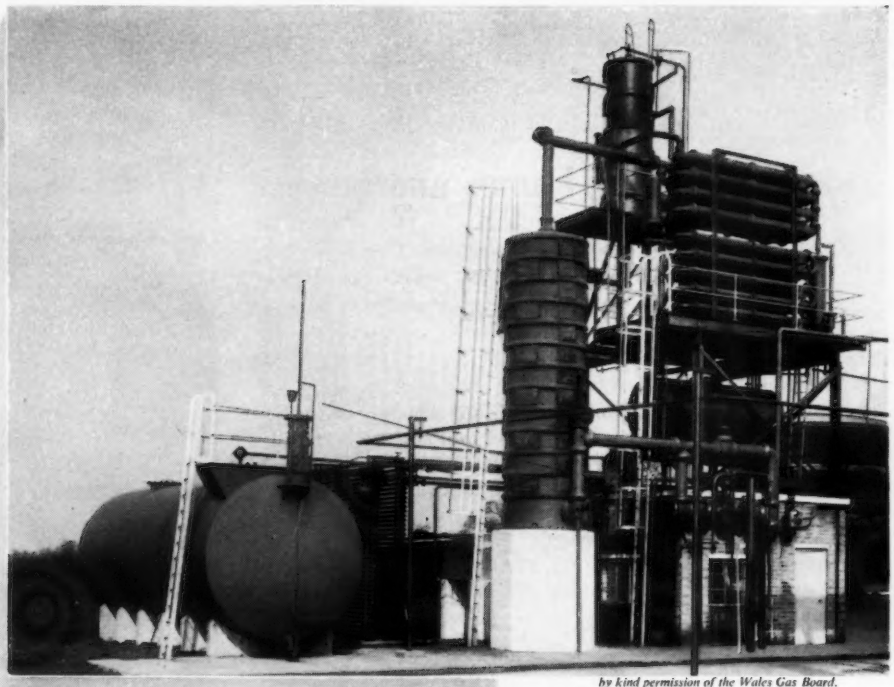

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Liquor Concentration Plant

A recent Liquor Concentration Plant Installation designed to treat 20,000 gallons of crude liquor per day.
Heat Exchange between raw and stripped liquors is installed with final cooling of the stripped liquor.

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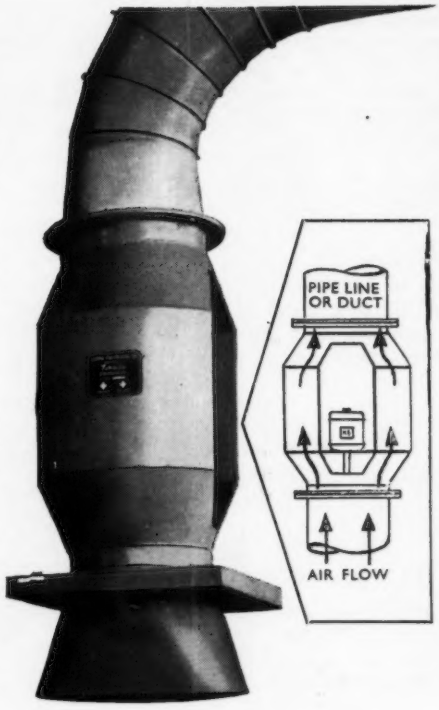

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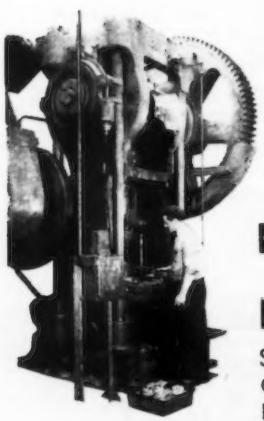

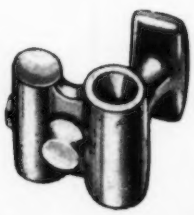

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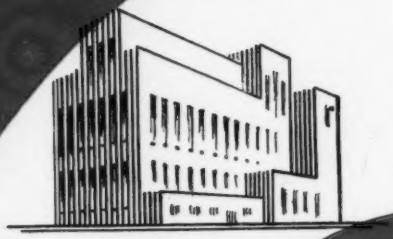
Two sides to the question . .



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